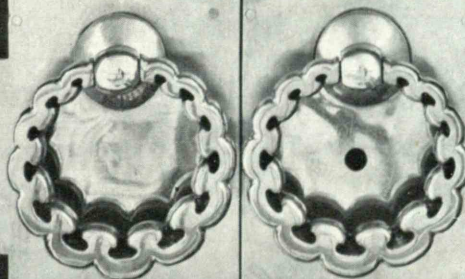
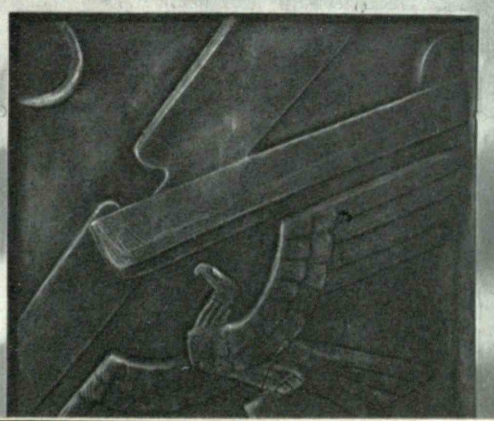
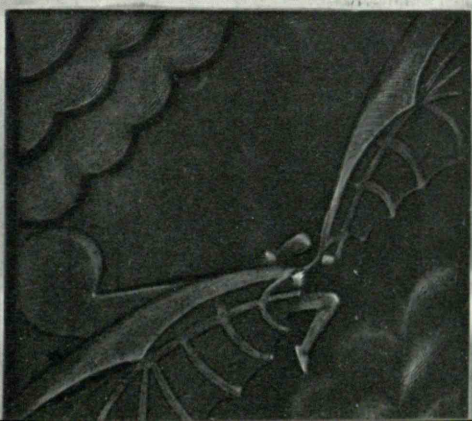
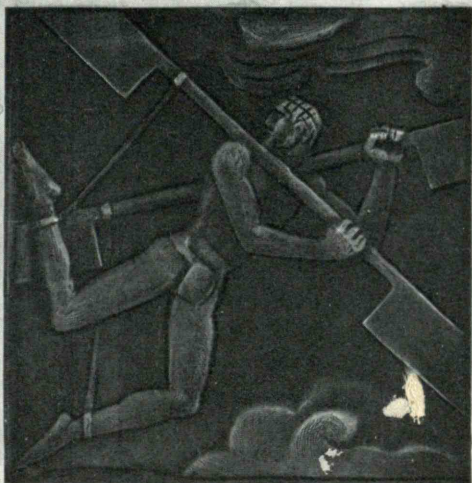
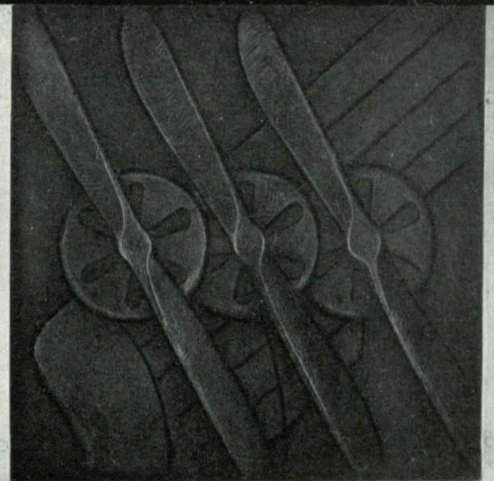


January 1939

TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office



technology review

Published by MIT

This PDF is for your personal, non-commercial use only.
Distribution and use of this material are governed by copyright law.
For non-personal use, or to order multiple copies please email
permissions@technologyreview.com.



MY NEW YEAR'S RESOLUTION

Chesterfields

FOR MORE PLEASURE

Copyright 1939, LIGGETT & MYERS TOBACCO CO.

THE TABULAR VIEW

TO detect and encourage sound books on science written for the layman or, rather, for the intelligent reader who wishes to be informed about "the greatest triumph of the human mind" is a proper function of this magazine, and we are exercising it to a greater extent than ever before. You will note, for example, the thoroughgoing review by NORBERT WIENER in this issue's Trend of Affairs section and you may recall the extensive review last month of Hogben's "Science for the Citizen." The Review feels that it has one of the best opportunities of any magazine to provide readers with sound appraisal of popular science literature, and it expects to do so.

A GRADUATE of the United States Naval Academy in 1910, Commander HENRY E. ROSSELL, C. C. U.S.N. Retired, received his S.M. from the Institute in 1915, joined its staff in 1931, and became the head of its Course in Naval Construction, succeeding Professor Hovgaard, in 1933. The Review presents Commander Rossell's article on page 120 in response to requests from readers for a discussion of the importance of aircraft in warfare, and there is probability that other experts will discuss air offense and defense in later issues of The Review. Commander Rossell's article is presented only as the private ideas of the author. ☛ Anyone who carries in the back of his mind the amusing story of the American engineer, temporarily living in Mexico, who did not know there were termites in his home until the piano fell through the parlor floor will want to know more about these destroyers. CHARLES H. BLAKE, '25 (page 123), is an assistant professor of zoölogy, having joined the staff at M.I.T. in 1924. He is a fellow of the American Academy of Arts and Sciences, a trustee of the Boston Society of Natural History, and associate curator of mollusks for that society.

BECAUSE this issue is his last, the retiring Editor ventures to close it on a note more personal than normally is appropriate for these pages. He salutes The Review readers and contributors, for he knows well that they have given the magazine its chief strength and distinction during the 13 years — 115 issues — that he has known it. More specifically he bears tribute to these: to his chief, the Publisher, whose achievement it has been to make The Review a soundly organized and stable enterprise and a magazine with which one may be proud to be associated; to the Business Manager whose skill in breaking down the barriers between the counting room and the editorial desk has given The Review singleness of purpose along with abundant solvency; to the staff, named and unnamed on page 109 and experts all, who in every sense have been partners in our enterprises; and to all of the above together, for they have formed an organization of which it has been an experience in friendship to be one part. Finally he salutes the incoming Editor, for he has great contributions to make to The Review and abiding satisfactions to be obtained from it.

J. R. K.

No. 12

Just for Fun!

A CHALLENGE

TO YOUR INGENUITY

TWO well-insulated compartments, filled with a "perfect gas," are maintained at absolute temperatures T_1 and T_2 respectively. If a large tube connects the compartments, the pressures (P_1 and P_2) naturally tend to equalize, but [believe it or not] if the proportions of



the tube are suitably reduced, the dynamical theory of gases indicates that a steady state will be reached in which the relationship $P_1/P_2 = [T_1/T_2]^{1/2}$ is approached. Can you verify and explain this formula?

Mr. O. Brune, 50 Galway Road, Parkview, Johannesburg, Union of South Africa, won our Puzzle No. 4 prize contest. See page 106.

We specialize in solving problems for industry.

Write for information on our
"GUARANTEED RESEARCH SERVICE"

CALIBRON PRODUCTS, INC.

West Orange, New Jersey

THIS INSTRUMENT —



IS NOT A BARGAIN!

The Cambridge Exhaust Gas Tester is not a gadget made to sell "at a price." It is a practical precision instrument for determining air-fuel ratio with laboratory accuracy in the shop, on the road and in the air. Sound design and good workmanship make it rugged as well as accurate. Special models are available for garage service, fleet operation and aviation. You get what you pay for in a Cambridge.

The Cambridge is a precise, rugged instrument that operates as well on the road or in the air as in the shop.

Send for Booklet No. 144E

**CAMBRIDGE
EXHAUST GAS
TESTER**

CAMBRIDGE INSTRUMENT CO., INC.
3732 Grand Central Terminal New York City

MAIL RETURNS

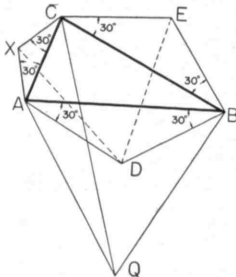
LETTERS FROM REVIEW READERS

Prize Puzzle, 4's, and Gears

FROM THEODORE M. EDISON, '23:

The prize offer for the best solution (with proof) of the puzzle (No. 4) which appeared in the Calibron Products, Inc., advertisement in your February, 1938, issue led to such a prodigious expenditure of effort that our conscience bothered us a little! However, your readers showed so much interest in problems for their own sake that the series was continued.

The \$25 prize went to O. Brune, '28, for the following beautifully simple analysis:



The problem: Starting with *any* triangle ABC , construct three exterior triangles having base angles of 30° and vertices at D , E , and X — as indicated in the diagram. If the distance DE is taken as 100, what is the distance DX ?

Solution: $DX = DE = 100$.

Proof: On the side AB construct also the exterior equilateral triangle ABQ and draw the straight line CQ . Now the triangles EBD and CBQ are similar, for $BC/BE = [BA/BD] = BQ/BD$ ($=\sqrt{3}$) and $\angle EBD = \angle CBQ$ ($=\angle B + 60^\circ$). Therefore, $QC/DE = BQ/BD$ ($=\sqrt{3}$). In the same way the triangles XAD and CAQ are similar, and $QC/DX = AQ/AD = BQ/BD$ ($=\sqrt{3}$). Therefore, $DX = DE$.

Q. E. D.

Most of the 67 solutions, sent in by 62 individuals, were long — one running to six pages of neatly listed formulas. Seven additional replies were ruled out because they were inadequate: They dealt with special cases or based their "proofs" on a statement of ours that the answer was a definite number.

We do not recall how we first learned of the relationship upon which our puzzle is based (we did not find it ourselves), but we here extend our congratulations to the discoverer of the fact that DEX is an equilateral triangle. A very good proof, received from L. B. Tuckerman, '06, of the United States Bureau of Standards, shows that the external isosceles triangles may be replaced with equivalent internal triangles to obtain a similar result.

...

Turning now to the two other problems which stirred up most discussion, here is the answer to Puzzle No. 2 (December, 1937, Review). The numbers 32, 36, and 64 can be expressed with two 4's and symbols as follows:

$$32 = \sqrt[4]{4}, [= 4^{3/4}]; 36 = \frac{4!}{\sqrt{4}} \left[\frac{4 \times 3 \times 2 \times 1}{\sqrt{.4444 \dots}} = \frac{24}{\sqrt{4/9}} \right]; 64 = \sqrt{\sqrt{4^{4!}}}$$

In Puzzle No. 10 (November Review), our specifications would be all right for simple rollers, but with gears, the di-

mensions must be changed to keep the teeth from jamming. The gears will run properly on their pitch lines when the diagonal dimensions have certain definite values only. One of these is about .007" less than the 4" dimension specified. Starting with an arrangement in which the four gears are in perfect mesh on their pitch lines, one diagonal dimension can be increased slightly, provided that the other diagonal dimension is *also increased*! Thus, in our problem, the 4" dimension can be retained if the 3" distances between gear centers are increased a little — still using 3" gears. In spite of the fact that the fit would then appear to be loose, the system will run with practically no lost motion.

West Orange, N. J.

Air Conditioning in England

FROM ARTHUR B. MARSH, '29:

I have noted with considerable interest the article on page 10 of The Review for November — the article on the L. M. S. centennial. It was of interest to me not only because of the opportunity I enjoyed this summer of seeing the displays of rolling stock and locomotives here in London's Euston Station but because the article referred to the more modern phases of air conditioning as applied to British railway carriages.

At the present time I am representing the Carrier Corporation of Syracuse, N. Y., as liaison officer to J. Stone and Company of London. Believing it might be of interest to you, perhaps I can elaborate somewhat on the article. The "air conditioning" referred to on L. N. E.'s *Coronation* and *Coronation Scot* is in reality not true air conditioning as we know it. These trains do possess "pressure ventilation," which is filtered air circulated by a fan to the car interior through a concealed air-distribution system. It incorporates no cooling, humidifying, or dehumidifying provisions. This system was installed by the company with whom I am associated here in London.

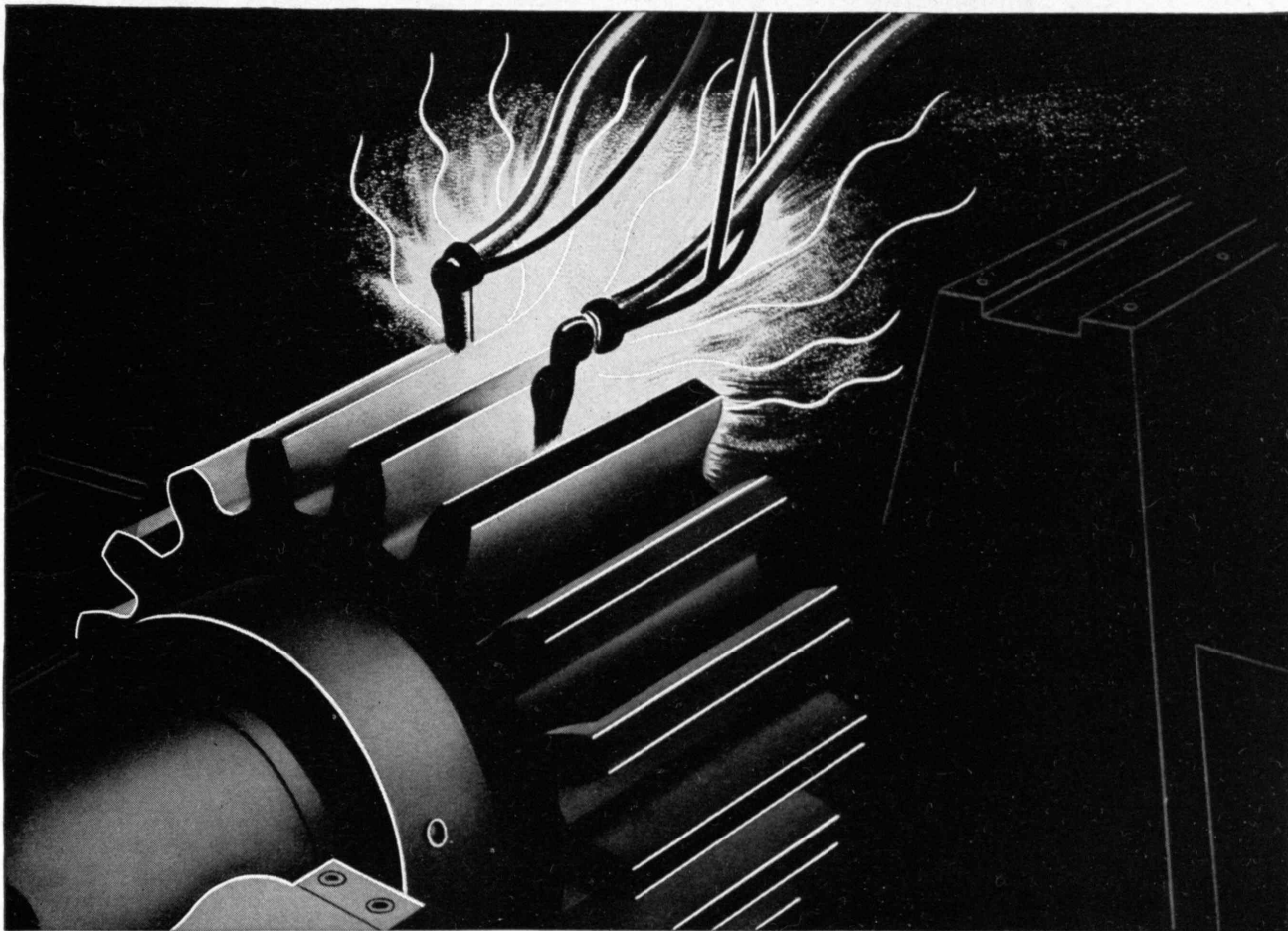
It is interesting to note that in this type of ventilation plus filtering of the air, the British roads were somewhat ahead of American roads, as this type of system was in use in England and some of the Dominions before true air conditioning was devised for railway cars.

The L. M. S. will actually be the first British road or, rather, the first in England proper, to inaugurate true air conditioning when the new royal train goes into operation sometime during the year. It will make provision for cooling the air in addition to proper filtering of the air in summer and will heat and filter the air in winter by means of its specially designed air conditioner. Elaborate separation of the air supplying the smoking lounge from that supplying the royal suites is made for purposes of refinement. The carriages, when completed, will in every way incorporate the finest the railway and its suppliers are able to offer Their Majesties.

The air-conditioning industry is naturally interested in developing the railway market to the utmost, and while a marked improvement in the "feel" of the air will definitely result even in moderate climates, it is easy to understand the British point of view when during a summer the maximum temperature on perhaps six occasions reaches 84 degrees F. accompanied by moderate humidities.

I believe, however, there will be a very gradual adoption on English roads of the benefits of air conditioning that we now take as an accepted fact.

London, England



ECONOMY - WITH A MORAL

FLAME HARDENING of steel where exceptional wear resistant properties are required is comparatively new, but the economies resulting from its application in conjunction with Molybdenum steels, are most significant. They are graphic proof of the cash value of constantly re-studying your production processes and material specifications in the light of improved methods and Moly steels.

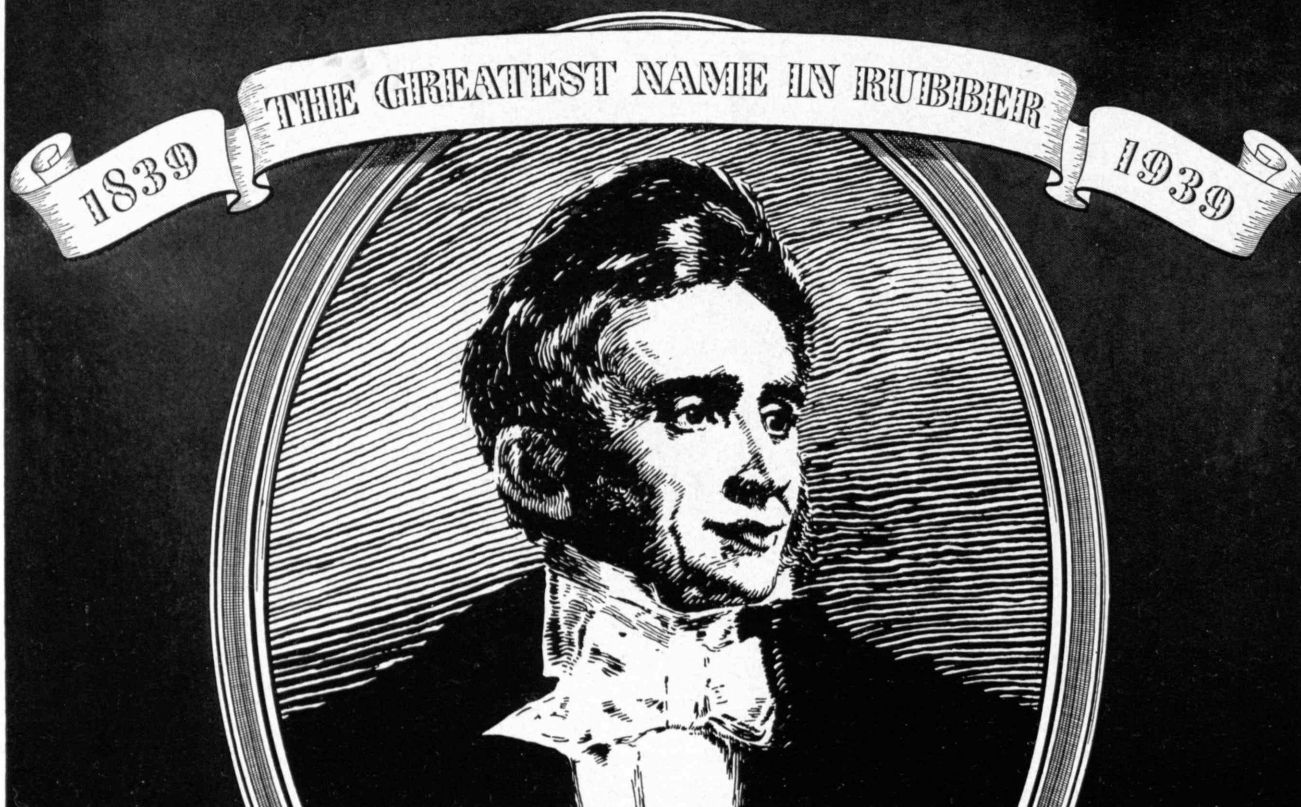
When high wear resistance plus good physical properties are required, flame hardening makes the use of relatively inexpensive alloy steels possible.

Molybdenum steels, particularly SAE 4140, 4150 and high Carbon (0.40-0.50% C) Manganese Molybdenum, are exceptionally suited for flame hardening. They are practically fool-proof. Molybdenum (next to Carbon) is the most effective hardening agent normally added to steel.

Molybdenum steels and irons make production dollars go further in many ways. Our booklet, "Molybdenum in Steel", containing a great deal of practical data will be sent free on request to technical students and others interested.

PRODUCERS OF FERRO-MOLYBDENUM, CALCIUM MOLYBDATE AND MOLYBDENUM TRIOXIDE

Climax Mo-lyb-den-um Company
500 Fifth Avenue • New York City



Chas Goodyear

THIS year marks the One Hundredth Anniversary of the discovery of the vulcanization of rubber. In recognition not alone of Charles Goodyear's contribution to the world, but also of the self-sacrifice, the faith and courage of the man, this tribute is published by an enterprise which, though founded long after his death, has striven under the inspiration of his example, and seeks by serviceability to deserve his name.

THE GOODYEAR TIRE & RUBBER COMPANY, AKRON, OHIO

HE walked the streets in downpouring rain in a strange garment of rubberized cloth.

He met the jeers of the world with a faith that neither disaster nor seeming disgrace could conquer.

He laid upon the altar of his work all the dear things of life — health, family, friends, fortune, happiness.

He was cast into prison for debt.

He felt himself "appointed of God."

He discovered the vulcanization of rubber.

His name was Charles Goodyear.

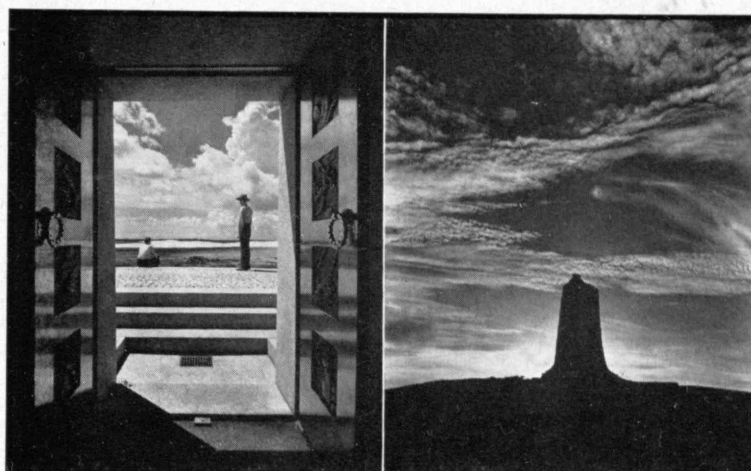
♦ ♦ ♦

NOTWITHSTANDING all the difficulties he encountered, he went on. If there was reproach, he bore it. If poverty, he suffered under it. But he went

on, and people then saw, when his invention was completed, that what they had been treating with ridicule, was sublime; that what they had made the subject of reproach, was the exercise of great inventive genius; that what they had laughed at, the perseverance of a man of talent with great perceptive faculties, with indomitable perseverance and intellect, had brought out as much to their astonishment, as if another sun had risen in the hemisphere above . . .

"I believe that the man who sits at this table, Charles Goodyear, is to go down to posterity in the history of the arts in this country, in that great class of inventors, at the head of which stands Robert Fulton . . . in which class stand the names of Whitney, and of Morris, and in which class will stand 'non post longo intervallo' the humble name of Charles Goodyear."

From the address of DANIEL WEBSTER before the U. S. Circuit Court, District of New Jersey, in 1852.



F. S. Lincoln, '22

On the cover of this issue are reproduced the handsome doors of the Wright Memorial, Kill Devil Hill, N. C. Here the doors stand open (left). The nearer picture shows the memorial silhouetted against a cloud-flecked sky

THE TECHNOLOGY REVIEW

Title Reg. U. S. Pat. Office

EDITED AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

VOL. 41, NO. 3

CONTENTS

JANUARY, 1939

THE COVER

DOORS OF WRIGHT MEMORIAL, KILL DEVIL HILL, N. C.

From a photograph by F. S. Lincoln, '22

NEWS	FRONTISPIECE	110
PEAKS AND VALLEYS	FROM A PHOTOGRAPH BY BRADFORD WASHBURN	118
NAVAL ARMAMENTS	BY HENRY E. ROSSELL	120
<i>Do Aircraft Offer a Serious Challenge to Battleships?</i>		
THEY ATTACK WOOD	BY CHARLES H. BLAKE	123
<i>Living Agencies of Timber Destruction</i>		
<hr/>		
TABULAR VIEW		105
<i>Contributors and Contributions</i>		
MAIL RETURNS		106
<i>Letters from Review Readers</i>		
THE TREND OF AFFAIRS		111
<i>News of Science and Engineering</i>		
THE INSTITUTE GAZETTE		127
<i>Relating to the Massachusetts Institute of Technology</i>		

Editor

J. RHYNE KILLIAN, JR.

Publisher

HAROLD E. LOBDELL

Business Manager

RALPH T. JOPE

Editorial Associates

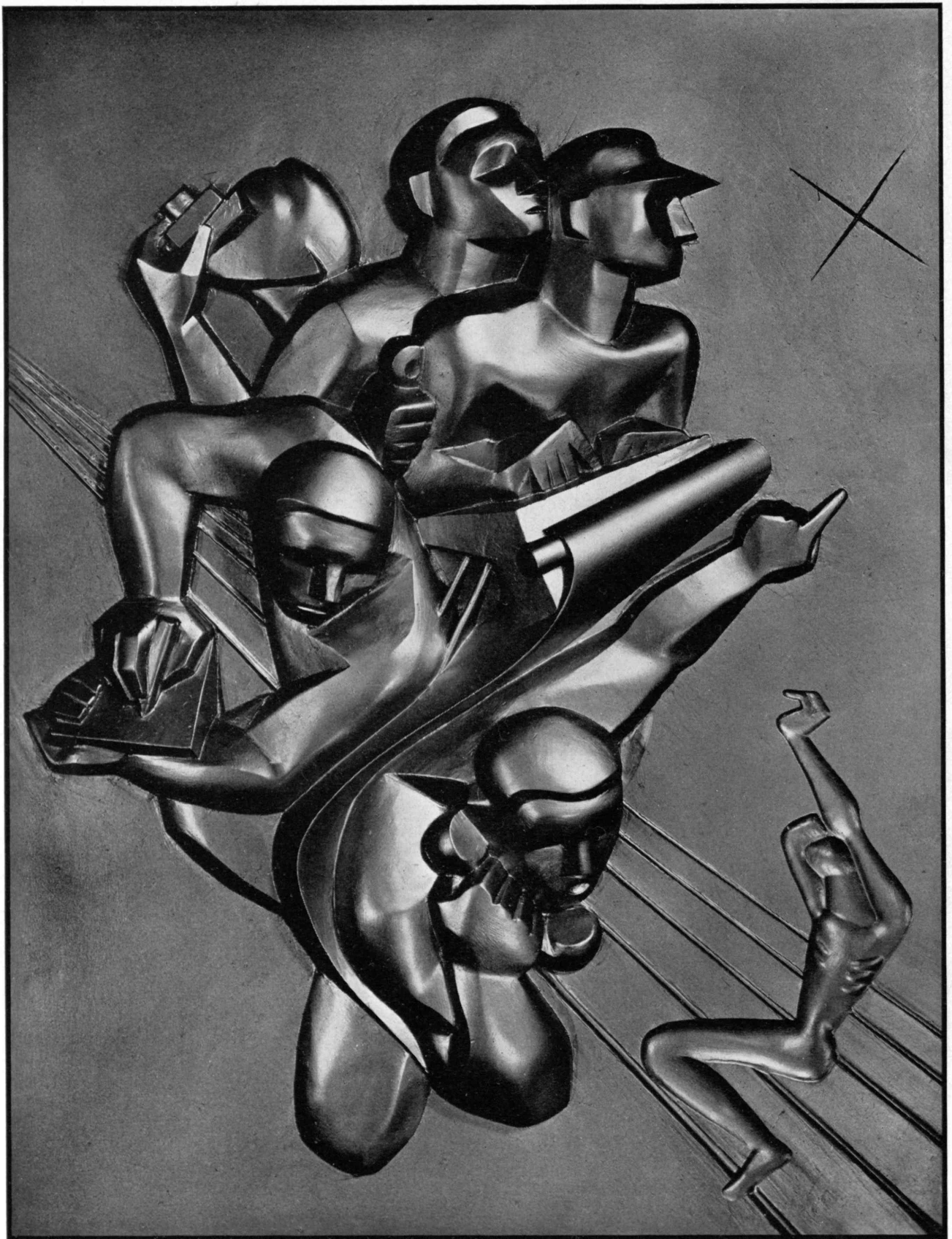
J. E. BURCHARD · PAUL COHEN · T. L. DAVIS · F. G. FASSETT, JR. · P. M. MORSE · J. J. ROWLANDS

Staff

Editorial: MARJORIE FULLER, JANE McMASTERS. *Business:* MADELINE McCORMICK, RUTH KING

PUBLISHED MONTHLY FROM NOVEMBER TO JULY INCLUSIVE ON THE TWENTY-SEVENTH OF THE MONTH PRECEDING THE DATE OF ISSUE AT 50 CENTS A COPY. ANNUAL SUBSCRIPTION \$3.50; CANADIAN AND FOREIGN SUBSCRIPTION \$4.00. PUBLISHED FOR THE ALUMNI ASSOCIATION OF THE M.I.T. H. B. RICHMOND, PRESIDENT; ARTHUR L. TOWNSEND, RAYMOND STEVENS, VICE-PRESIDENTS; CHARLES E. LOCKE, SECRETARY; RALPH T. JOPE, TREASURER. PUBLISHED AT THE

RUMFORD PRESS, 10 FERRY STREET, CONCORD, N. H. EDITORIAL OFFICE, ROOM 3-219, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE A, MASS. ENTERED AS SECOND-CLASS MAIL MATTER AT THE POST OFFICE AT CONCORD, N. H. COPYRIGHT, 1938, BY THE ALUMNI ASSOCIATION OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY. THREE WEEKS MUST BE ALLOWED TO EFFECT CHANGES OF ADDRESS. BOTH OLD AND NEW ADDRESSES SHOULD BE GIVEN.



© F. S. Lincoln, '22

NEWS

Model of a plaque by Isamu Noguchi for the Associated Press Building, New York City

THE TECHNOLOGY REVIEW

Vol. 41, No. 3



January, 1939

The Trend of Affairs

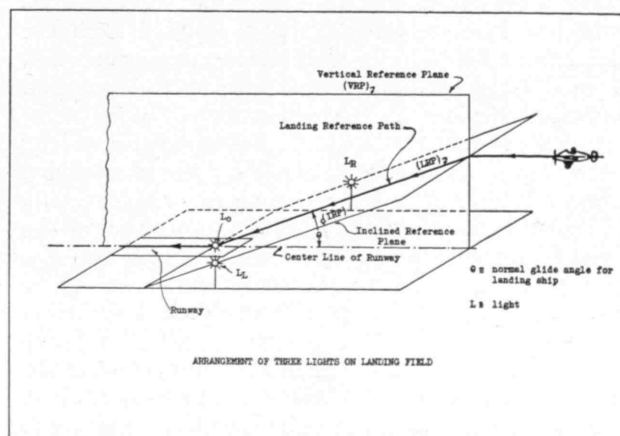
Trails in Space

THE power of coöperative investigation which is realistic enough to exhaust the possibilities of available existing materials before undertaking to construct new ones has been well illustrated at the Institute during the past year. The development of a blind-landing device for airplanes which bids fair to overcome one of the greatest hazards of aviation is the illustration. Previous systems utilizing "beam flying" have been only partially successful; a scheme which will give a fog-blinded pilot information about the position of his ship with respect to both its own horizontality and its relation to the landing field can be expected to come nearer complete satisfaction. And if the information can be got to the pilot in a form readily interpretable in geometric terms, so much the better.

If on a clear night an airplane nears a landing field, the pilot can be guided to a safe landing by means of three sources of light — one centered at ground level near the end of the field where the ship is to make contact, the others elevated aboveground opposite each other at each side of the field and some distance in front of the first light. The three thus sighted from above define a plane; if the pilot comes in on an imaginary line bisecting the plane, all will be well. This imaginary line is in fact a landing reference path. So reasoned Irving Metcalf of the Bureau of Air Commerce. Flying tests demonstrated the truth of his reasoning. Then developed the problem of getting the aid from such a light system reproduced in an airplane coming to land not on a clear night but in the midst of fog. An indirect application of the basic idea was needed.

For this, the Bureau of Air Commerce had recourse to M.I.T. The problem posed to a group headed by Professor Edward L. Bowles, '22, of the Department of Electrical Engineering was essentially this: to produce

in a fog-blinded plane in flight the illusion of the three lights, and to produce this illusion in such a way as to make clear the attitude of the plane and the direction of approach toward the field. Professor William M. Hall, '28, suggested that the gyroscopic equipment of the plane itself could be put to work in the solution, for this already gives information as to bank and climb, the aerial equivalents of the roll and pitch of a ship at sea. By the use of electrical circuits hooked to the gyro elements, involving the use of very delicate brushes only about three-thousandths of an inch in thickness, the gyroscopes were made to produce three spots of light on the screen of a cathode-ray oscillograph, thus creating the illusion in the plane of the unseen three lights on the field. Professor Charles S. Draper, '26, of the Course in Aeronautical Engineering brought his expertness with aerial instruments to bear on this phase of the problem.



Pictorial diagram, supplementing the adjacent story, showing the principle of the new blind-landing system. Here we see the straight line reference path down which a landing airplane may fly at its natural glide angle



Patch

SAUSAGE



Patch

BANYAN

TREES

... are made by God alone, the poet has told and told and told us. Their names, however, are the product of man's vernacular fancy, as some of these photographs from Hawaii by Claude E. Patch, '02, and Carl B. Andrews, '28, disclose. The sausage tree advertises its cognomen in its pods; the rattle of dry fruits in the wind is basis for the characteristic masculinism of the title of the "women's tongues"; that not all bark will bark the knuckles appears at your left, where the disembodied fist smites, unhurt, the soft integument of the red gum eucalyptus



End result was a system whereby bank and climb — the attitude of the plane — were indicated by changes in the positions of these three spots.

With the pilot thus enabled to keep his ship steady with a minimum of difficulty, the next question was that of bringing him to the field on a true line, literally that of blazing him a trail in space. Here two possibilities were to be canvassed — the infrared rays and radio waves. Infrared's fog-piercing possibilities, already much investigated, were examined thoroughly. Radio waves offered more assistance. In the system devised, two beams of these directed angularly upward from the field, one under the other but overlapping somewhat, are modulated at different frequencies. Antenna and conversion devices in the plane serve to keep the center spot of light on the instrument in position as long as the ship is on the path defined by the overlapping beams. Deviation into the region above or below shifts the center light accordingly. Thus the position of the airplane above or below the reference path and the angle of its approach to the earth are cared for. A similar arrangement was provided to govern deviation to the right or left through changes in the relative position of the right and left lights. In this aspect of the problem, the fact that the beams had to be sent up at an angle from the earth was of importance, for it meant that the effect of the earth upon them might cause the path to vary undesirably in slope and linearity. Hence it was essential that true controlled beams be available. Dr. Wilmer L. Barrow's ('29) method of projecting ex-

tremely short radio waves in narrow flat beams from horns here found immediate and practical application, which has provided material for graduate instruction.

During the first year of investigation of the problem, these were the developments. The instruments and indicators necessary have been completed in experimental form. The first year's work was positive in all its results, both those dealing with blind landing and those dealing with the use of the same instruments in route flying. Under a new agreement with the recently established Civil Aeronautics Authority, the radio phase of the question will almost entirely engross the researchers for the next 15 months. The practical consequences of the development are distinctly great, as is indicated by the coöperation of the aviation industry, the Army, and other associated groups.

It Floats

WHEN we heard the other day of a way by which printing ink might be removed from repulped paper, we picked up a trail leading to a versatile industrial process that's gaining importance steadily. A curiosity in 1903, a trend in 1912, a method that is handling 300,000,000 tons of ore a year at present, and tomorrow perhaps an established tool for the chemical engineer, flotation — for that's the name of the process — deserves more publicity than it has received.

As with any successful process, it has spread (amid continuous patent squabbles) because it has brought otherwise unobtainable profits, but its specific advantages are that in the mining industry it can generally handle leaner ores than can other methods — in fact, it has recovered minerals profitably from the dumps left by older, less effective processes; it can handle, must handle, finely crushed ores that give trouble in other concentrating methods; and it can do these things with a more compact plant and a simpler flow sheet.

These very small particles are the substance of flotation. As Charles E. Locke, '96, puts it, most of the low-grade ores mined today require very fine grinding before each ore particle is freed from all material not like itself, and "flotation becomes automatically the only means of high recovery." The thoroughness required in this operation is attested to by its up to 50 per cent share of the operating costs, the flotation step itself taking perhaps another 25 per cent.



WOMEN'S TONGUES

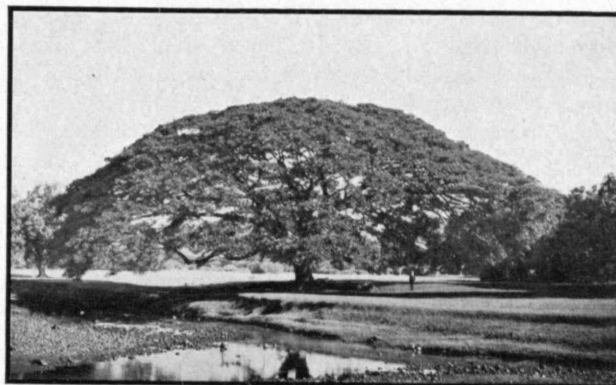
Patch

In its simplest form the flotation process consists first of finding some surface-active substance which will wet or film one type of particle in the ore but not other types. Quoting Professor Locke again: "If air bubbles are introduced into a properly prepared pulp or suspension of finely pulverized ore in water, particles of certain minerals (those filmed by the surface-acting substance) will adhere to the bubbles, whereas particles of other minerals will not show this tendency and will remain separately suspended in the water. The air bubbles in rising out of the pulp carry with them particles of one mineral or group of minerals, forming a mineralized layer of froth which may be removed as a concentrate."

Specific gravity is not a factor in this method, except in limiting the size of the largest particle which may be lifted by an air bubble. This value varies from 200 microns for gold to about 2,500 microns for some of the lightweight minerals like coal. (A micron is one-thousandth of a millimeter.) The optimum particle size is considerably smaller than the figures given, for the bubbles average about two millimeters in diameter, and the mineral particles must stick to the bubble's skin to form a ragged coat of mail.

The effects of this process have been felt in unexpected ways. Pine oil was quite early found an effective frothing agent — that is, a material capable of strengthening the bubble film so that it will not collapse prematurely. Fortunately heavy demand arose among the metallurgists just about the time when the naval stores industry was beginning the large-scale utilization of deadwood and stumps as sources of resin and turpentine. Among the by-products was pine oil, a substance extracted from the dead trees but not from the living ones.

In the mining of copper sulphide ores — at present the most important domain of the flotation process — the trend before its introduction was strongly toward larger and larger blast furnaces. The flotation process has brought radical changes by yielding a fine product exactly suited to the more economical reverberatory smelting furnace, using cheap pulverized coal. Blast furnaces which used the more expensive fuel, coke, and handled only coarse ore because fine material was blown out by the blast unless previously sintered, have largely passed out in the wake of flotation's steady progress.



MONKEY POD

Patch



Andrews

TREE FERNS

If the future sees the spread of the flotation process to iron-ore mining — and it probably will — the same effects may follow with repercussions on the economies of the steelmaking regions. Overshadowing the changes in plant, there may be the lowering of costs which must be paid by nations striving for self-sufficiency in steel with inadequate domestic reserves of high-grade ore but with plenty of low-grade material. If present plans to beneficiate the low-grade iron ores of Germany (containing an average of 34 per cent iron instead of the more than 50 per cent material generally mined) are realized, that country could easily double her domestic production of pig iron, at present only 20 per cent of her requirements. And even without that increase — with all its implications concerning foreign exchange — Germany may be the world's largest producer of steel in 1939. In this country, the Bureau of Mines reports that from the Mesabi district waste containing 17 per cent iron has been converted into concentrate containing 57 per cent iron at an estimated cost of \$1.30 per ton.

At the moment, however, attention is focused on the rapid spread of the flotation process to nonmetallic and even strictly chemical materials, many of them worth only from \$2.00 to \$15 a ton. According to the Bureau of Mines Report of Investigation 3397, outstanding achievements in this direction have been the beneficiation of phosphate deposits, cement rock,

limestone, manganese ores, fluorite, and the potash salts of Carlsbad, N. M. In the Florida fields alone, sufficient capacity now exists to handle 10,800 long tons of phosphate daily.

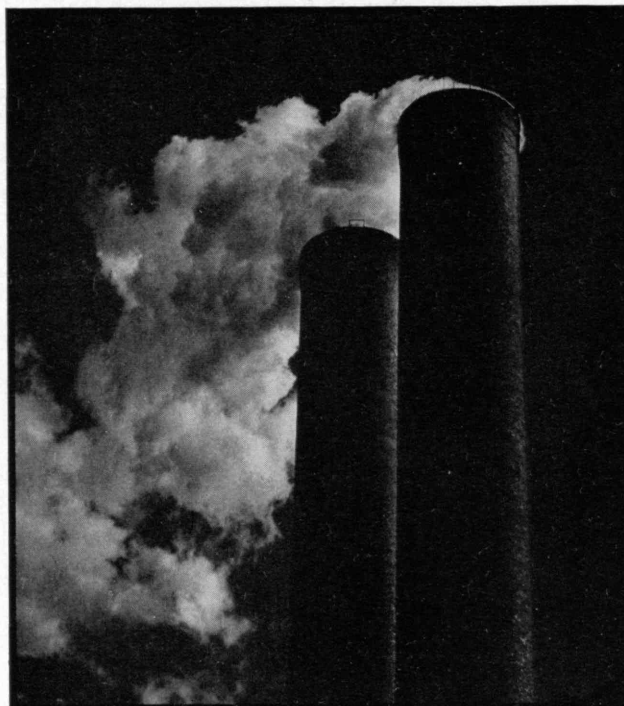
In coal mining, where the application is two decades old, a political factor now intrudes, for froth flotation can produce a coal very low in ash content, and such a product, besides being useful in the chemical industry, is the most desired feed for hydrogenation plants. The Bureau of Mines report mentions an "intriguing project in coal treatment" for the recovery of fossil resins: "Preferably flotation might act as a roughing process. . . . In Utah, New Mexico, and Washington some of the bituminous and subbituminous coal beds carry high amounts of 'fat' coal showing coarse grains of amber-colored resin. . . . If 15 to 20 tons of coal must be extracted to give 1 ton of resin, the flotation and drying costs probably will make the resin cost \$20.00 per ton above the cost of mining and transportation, which is normally carried by the coal anyway." Considering the prices that the natural resins bring in the market, the project is indeed intriguing.

Another unexpected application is in the separation of sodium chloride crystals from potassium chloride. The prospect of sidestepping much refining and recrystallization in the separating of crystalline materials has "already brought about considerable frenzied research." A German paper mill has successfully recovered over 90 per cent of the fiber in its waste water by flotation methods. A gentleman named Volokhyanskii has found that simply by bubbling CO₂ through sugar juices, much of the ash, nitrogenous matter, and colloidal substances that generally form molasses are concentrated in the foam. Albumin has been removed from potato juice, sugar-beet juice, and urine by similar methods, as have dyes and other capillary-active substances from their solutions.

Before evidence of this method's new-found versatility becomes repetitious, it might be well to draw back and make a final survey. No huge flows of power feature this process; no aspect touches the imagination. Like the properties it deals with, it is cold, subtle, a little obscure. And like many of the men whose fortunes it has changed, it gains prestige not from itself but from the things with which it deals.

Aiding Bones to Mend

NATURE may be helped in the business of mending broken bones and broken necks by new methods described lately before the Southern Medical Association by Dr. H. H. Hayes and Dr. Ralph M. Stuck. The new treatments offer improvement over older techniques in that each of them is designed to make life easier for the patient in the period during which the bone is setting. The plaster cast which



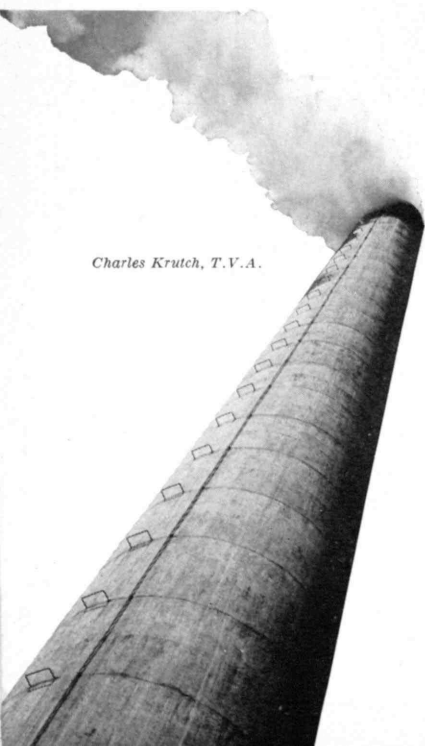
J. B. Titcomb

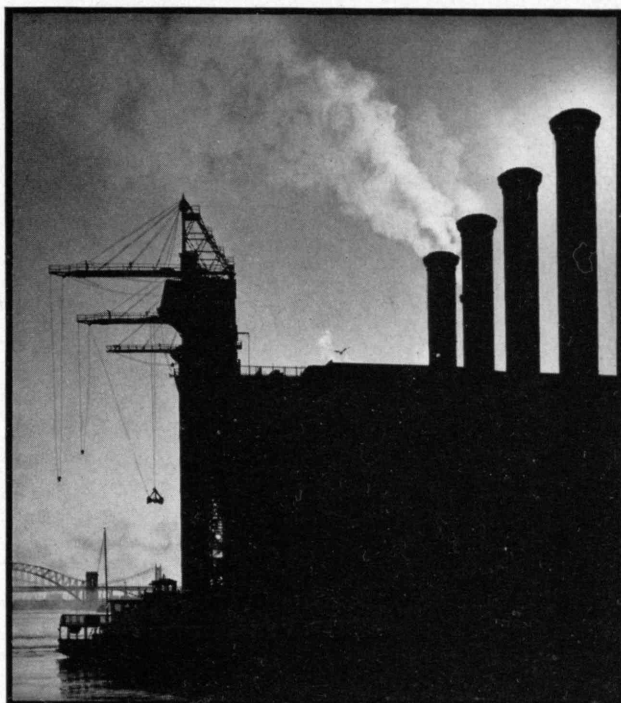
broken legs have required, for example, prevents use of muscles while it is in place, so that sometimes as long a period is required for the unused muscles to regain their efficiency as was required for the bone to knit. Dr. Hayes circumvents this difficulty by the use of a bone fixator which permits use of the muscles and thus keeps them in working order. Driving metal pins or screws into the bone above and below the break, he hooks them to a yoke and attaches them to a metal bridge across the gap between the broken parts of the bone. The ends of the bone are brought into alignment for healing by means of four universal-joint braces which can be adjusted to any position. Metal pins are driven through the bone across the point of fracture. A local anesthetic suffices for this operation which has permitted some patients with broken legs to get out of bed and walk about on crutches, or even to return to work, within a few days.

A somewhat similar scheme for assisting the healing of broken necks was described by Dr. Stuck. Here, the effort is to pull apart the broken fragments of the backbone, by holding the patient's head up, so that they may have time to heal. Two holes are bored in the skull just back of the normal hairline, and into them a retracting device, or clamp, is inserted. Wires attached to the clamp exert an upward pull of from five to 30 pounds from weights attached to their ends. The patient thus equipped may move about in bed and so is considerably more comfortable than under the former method of treatment. He is also set free from much of the discomfort of the plaster collar customarily used in such cases: When neck fractures are treated by the new method, the plaster collar need be used only late in the healing process.

Dr. Stuck reemphasized that many lives could be saved and many serious injuries avoided if spectators at accidents were less eager to move the victims.

Charles Krutch, T.V.A.





Charles Phelps Cushing

"March of the Iron Men"

BY NORBERT WIENER

IT is by no means an accident that this is a year in which more than one book has been written to popularize industrial and scientific history. In this epoch of violent change and violent threats we must at all costs read the portents in the heavens and interpret the records of the past. Industrial and scientific development are doing to us something which we do not fully understand, but the understanding of which is vital to our comfort, our prosperity, our happiness, and our continued existence. Thus it is not only natural but most devoutly to be wished that men should devote themselves to the interpretation of the history of science, the history of invention, and the social role these have played in past ages. It is equally natural, though not in all cases so fortunate, that those who choose to write on these subjects should bring to their authorship widely divergent and varied qualities of information, technical understanding, literary ability, and enlightenment.

"March of the Iron Men"* is not, and does not claim to be, an impartial history of invention and science in all times. It is a book with a thesis — the thesis that the union of the United States of America has been dependent on unprecedented burgeoning of the inventive talent and that this burgeoning in turn has been rendered possible to an extent greater in America than in all other countries by the merits and the environmental background of American pioneer stock and American pioneer life.

Thus the book is an ex parte book, and indeed an ex parte book is what the background and training of the author, Roger Burlingame, lead us to expect. His career has been that of the journalist, novelist, editor, and

* New York: Charles Scribner's Sons, 1938. 500 pages, \$3.75.

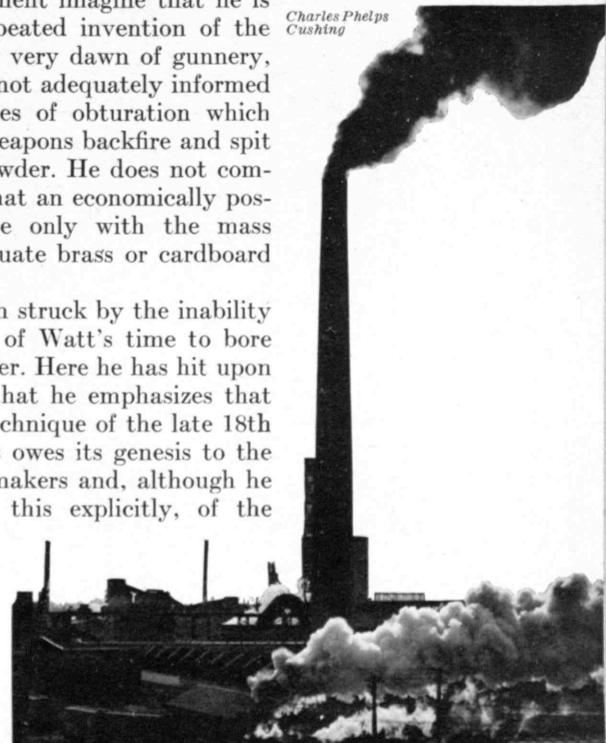
professional literary man. This is a career well calculated to train a man in the use of libraries, in the accumulation of obscure and odd scraps of information, and in the presentation of this material in the form which will appeal best to the headline interest of the public. It is a career which will lead one to place great value on the striking, the epigrammatic, and the unusual. It is not of itself a career which will lead to a deep knowledge of science in its emotional life and its internal history, nor is it particularly conducive either to a view of the private psychology of the inventor or of the value and importance of stages in an invention which has not yet come to full commercial fruition. Neither does it of itself guarantee the economic, sociological insight which will make a connected, solid whole of such a piece of historical investigation.

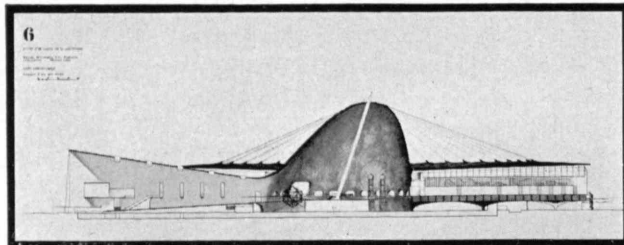
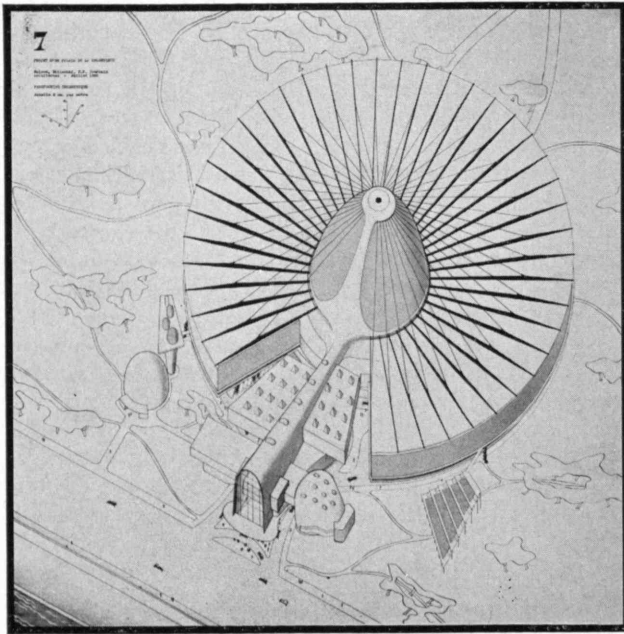
Mr. Burlingame's book possesses to a remarkable degree the virtues and the defects which we should expect of an industrial history from an author with his background. The interpretation of the careers of Colt and of Whitney is new to most readers and must have entailed a large amount of competent and scholarly documentary research. Mr. Burlingame is obviously an enthusiast for the sailing ship, and although the subject of the Yankee clipper has been well and authoritatively treated by other hands, there is an interesting freshness in his chapter. As a journalist the author ranks high in competence and enthusiasm and in the skill of telling a story.

Behind these qualities of ready pen and practiced authorship — the virtues of a journalist — lie a journalist's shortcomings. The book is commonplace in conception, is narrowly nationalist in attitude, and is marked by no profundity of scientific or sociological vision. Where a number of legitimate claimants can be found for the same invention, Mr. Burlingame almost always picks the American without an adequate discussion of the merits of the case. Where an invention could have been made in a crude form in earlier times, although technical difficulties would have stood in the way of its effectiveness, Mr. Burlingame ridicules the primitive artisan. He is struck with the obviousness of the breechloader and wonders why such an idea was missed by the stupid gunsmiths of the 18th Century. I do not for a moment imagine that he is unaware of the repeated invention of the breechloader in the very dawn of gunnery, but he is probably not adequately informed as to the difficulties of obturation which made these early weapons backfire and spit and waste their powder. He does not comment on the fact that an economically possible solution came only with the mass production of adequate brass or cardboard cartridge cases.

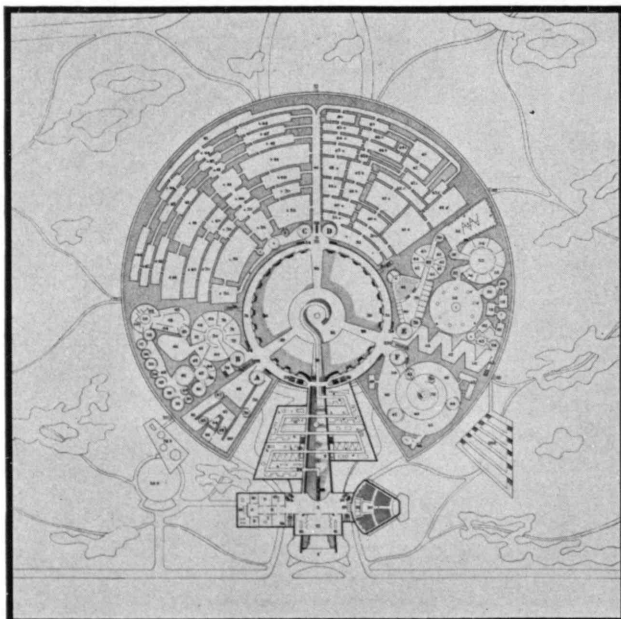
Again, he is much struck by the inability of the ironmasters of Watt's time to bore a true steam cylinder. Here he has hit upon the right clue, in that he emphasizes that the machine-tool technique of the late 18th and 19th Centuries owes its genesis to the craft of the watchmakers and, although he does not mention this explicitly, of the

Charles Phelps Cushing





Air view and section of proposed science museum show monolithic platform, funnel entrance, and parabolic dome (symmetrical in other section) from whose crown hang cables supporting radial roof beams, hinged where they abut the dome. This permits unusual plan flexibility for exhibiting the disciplines: A mathematics, B astronomy, C physics, D chemistry, E biology, F medicine. See adjacent story



instrument makers of the preceding generation. But he is not awake to the time and hard work of experiment necessary before these small-scale methods could be applied to the large-scale needs of heavy industry. In this connection he curiously misses a point vital to the history of invention in the Industrial Revolution: the tremendous effect on the clockmakers and instrument makers of the navigator's need for a method of determining longitude at sea.

Furthermore, in his discussion of the clipper ship we do not find a satisfactory treatment of one of the chief differences between American navigation and British navigation in the 19th Century — one which is most significant for modern industry. By this I mean the way in which American ships were racked to pieces in order to bring a maximum of profit in a few voyages, while English ships were less efficient money earners but had far longer lives. This new practice in the treatment of obsolescence is quite as vital to modern industrialism as the notion of interchangeable parts on which Mr. Burlingame lays such stress.

Besides the glorification of the American inventor as opposed to his foreign brother — which is indeed one of the theses of the book — there is a general Lothrop Stoddardism, a general tendency to exalt the old American stock at the expense of the inferior immigrant of the present day. Mr. Burlingame does not like foreigners unless they happen to be dictators. Of these indeed he speaks in measured tones of awe.

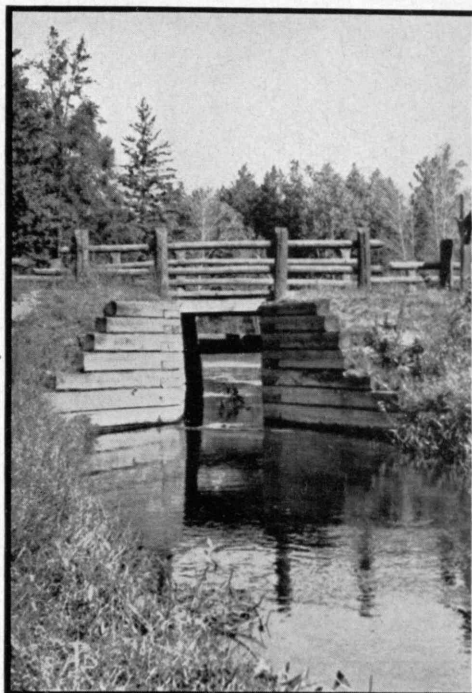
Mr. Burlingame and Mr. Hogben in his "Science for the Citizen" are exploiting mines in the same geological formation. Mr. Hogben, for all the possible merits and demerits of his highly individual methods, is exploiting his mine both as a scientist and a citizen. Mr. Burlingame has found in his own a profitable vein of copy.

Projet d'un Palais de la Découverte

MUSEUMS of science are attracting increasing attention in America as witnessed by the success of such institutions in New York, Chicago, Philadelphia, Cambridge, and Washington. In this country, as in Europe, they have made important contributions to public education, to the social assimilation of science, and to museography. They have profoundly affected the presentation techniques of all museums, even those devoted to art.

It is therefore not unexpected that planners of science museums should dare further innovations, even if only on paper. We refer to the extraordinary "Projet d'un Palais de la Découverte" exhibited last month at M.I.T. by Paul Nelson, native Chicagoan, wartime aviator, rebellious graduate of the Beaux Arts in Paris, where he has been a long-time resident and militant student of modern architecture.

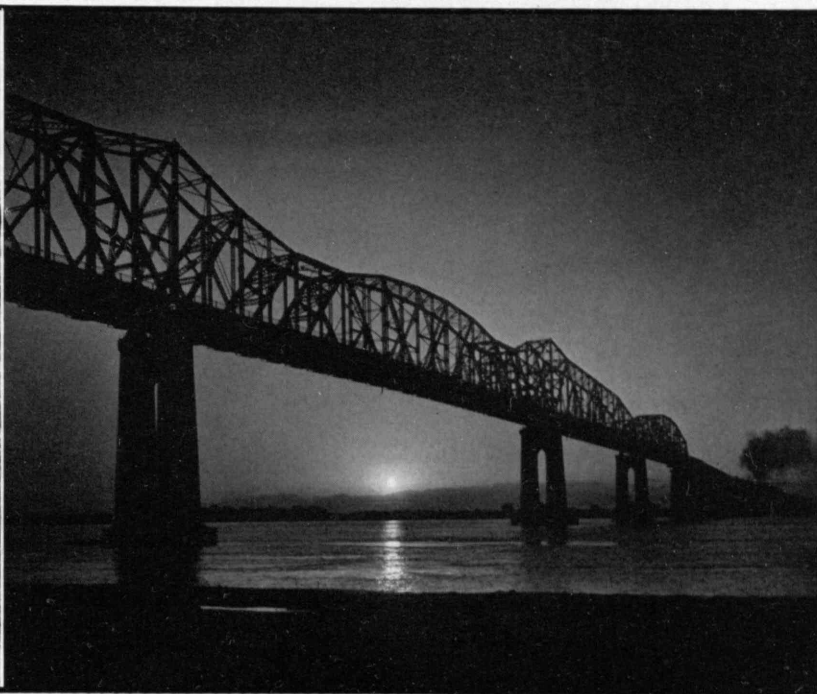
The project arose from the success of the scientific show at the recent Paris Exposition. Nelson, assisted by two young Frenchmen, Nitzschké and Jourdain, was commissioned, with the help of French scientific circles, to make the studies for a permanent exhibition hall. Associated with him in the study were several distinguished French scientists. The project was completed



W. W. Lewis, '89

FIRST

How the Father of Waters grows in some 2,500 miles of his course may be gauged from these bridges — on the left the first span across the Mississippi, in Itasca State Park, Minnesota; on the right the Huey Long Bridge near New Orleans



F. S. Lincoln, '22

LAST

and ready for presentation to President le Brun and to Edouard Herriot after the vacations — but before the vacations were over came Munich.

First conviction of the program was that a museum of science (and the very word museum has an unfortunate connotation) must be so flexible and extensible both horizontally and vertically as to permit freedom of change in the interest of presenting a living exposition of science always in evolution. Second premise was that a museum of this sort should employ the most modern methods of construction and the most modern materials as an epitome of scientific progress. Third, and final, belief was that it is necessary to seduce the average visitor and to "render his psyche malleable" by some sensational approach to the special disciplines which would require a closer study than he might otherwise give.

Feeling that the visitor to the ordinary museum has his first impressions blunted by material preoccupations with rubbers, umbrellas, cameras, and tickets, the architect has contrived that these activities take place in a small, covered lobby whence one can see nothing of the displays to follow. Thence he enters a funnel-shaped great concourse which leads him to a huge vaulted arena of truly colossal scale where he will be subjected to dramatically powerful demonstrations of the vigor of science.

From such a center he is to be allowed to pass by one of the three ramps to the three segregations of the disciplines: (1) astronomy and mathematics; (2) physics and chemistry; (3) biology and medicine. In order to provide the flexibility desired, Nelson has contrived the interesting notion of building as rigid structure only the funnel, the great hall, and the huge circular platform

which supports the exhibitions of the disciplines. Beneath this platform are to be the services. The platform is sheltered by a huge suspended roof supported from the vault by an interesting and entirely plausible structural method. From this roof, in turn, may be suspended the ceilings of the individual exhibition halls which may be entirely temporary. The whole building is, of course, inclosed in a sheltering envelope. The maximum modern facilities of lighting and air conditioning are assumed in the solution.

The arrangement of the disciplines was suggested by a specialist in each field. Physics and chemistry are closely related, and in the former, tangential axes care for mechanics, thermodynamics, classical optics, electromagnetism, radioactivity, radiation, statistical analysis, and wave mechanics, respectively; while radial axes carry the visitor through general introduction and measurements, discontinuous phenomena, continuous phenomena, and applications, respectively. To stress principles basic to all the sciences, it is possible to pass smoothly from a field in physics, for example, to the related field in chemistry. In medicine the visitor is introduced to the center of a spiral where he views the healthful man and then passes outward through a display of those things which weaken man and make him ill, and so to expositions of diagnosis, of therapeutics, and, finally, of preventive medicine. Not only was this project large in scale (700 feet

(Concluded on page 146)

On the Next Two Pages

... peaks and glaciers in Alaska and Canada, as infrared film records them in 1/100 second from an elevation of 15,000 feet. This oblique aerial photograph by Bradford Washburn shows mountains, from left to right, Lucania, 17,150 feet; Logan, 19,850, the highest land in Canada; Vancouver, 15,720; and St. Elias, 18,000, these last two in Alaska. In the foreground Martin River Glacier lies crumpled, with Bering Glacier at the upper right and Tanagla Glacier on the left







United States Navy

THE opinions or assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

NAVAL strategists tell us that the primary function of a fleet in time of war is to maintain control of the sea and thereby to deny use of the sea to the enemy. Usually, however, the control is exercised over only a comparatively restricted zone which is of particular significance in a military sense.

For example, in the World War, Germany used naval power to control the Baltic and thereby to cut off Russia from sources of supply except through several unsatisfactory ports on the Arctic and Pacific oceans. Doubtless Russia's early collapse was caused largely by her partial isolation—the direct result of this exercise of German sea power.

Also in the World War, Great Britain controlled the North Sea, the English Channel, and the other waters surrounding the British Isles. This control was essential to Britain's existence as a belligerent, for without it her armies could not have been transported to France, nor could her civilian population have survived. Another important advantage enjoyed by Great Britain by virtue of her control of the sea lay in the shutting off of supplies to Germany. Thus British sea power advanced the cause of the Allied armies and impeded that of the enemy.

Naval Armaments

Do Aircraft Offer a Serious Challenge to Battleships?

By HENRY E. ROSSELL

THE FUNCTIONS OF A FLEET—MAINTENANCE OF CONTROL OF THE SEA—CLAIMS FOR AIRPLANES—HISTORICAL ANALOGIES—NEGLECT OF OLD WEAPONS—MEANS OF ATTACK FROM THE AIR—MEANS OF DEFENSE—A HYPOTHETICAL WAR

Many similar examples, such as Japanese naval strategy in the Russo-Japanese War, could be cited to illustrate the exercise of the primary fleet function of control of the sea or such restricted part of the sea as is involved in military objectives.

Of course there are many other fleet functions, all of which must be considered as of secondary importance. One of these duties in the late War, for example, was to mop up the few scattered ships of the German navy still at large after the outbreak of the war. So long as they were afloat, these vessels constituted a threat to Allied commerce. Naval operations in connection with secondary functions may often lead to spectacular feats or even to naval battles: Witness the remarkable career of the *Emden* and her destruction by the Australian cruiser *Sydney*; the cruise of Von Spee's squadron from China to South America, its defeat of Craddock at Coronel, and its destruction by Sturdee's battle cruisers off the Falkland Islands.

MAINTENANCE OF CONTROL OF SEA

Returning now to the primary fleet function, let us inquire how it is executed. Up to the present, its execution has required, in the sea zone of interest, ships of maximum offensive and defensive power, that is, battleships. These have been supported, it is true, by numerous smaller and swifter ships, such as cruisers and destroyers, and by auxiliary vessels, such as mine layers, mine sweepers, colliers, and supply ships. The real control of the sea has been won and held, however, by the mailed fist in the form of battleships. That this type of vessel still is relied upon to perform this primary fleet function may be inferred from an examination of current naval building programs throughout the world. It has been many years since as many battleships have been simultaneously under construction as at present.

CLAIMS FOR AIRPLANES

Nevertheless, there are many laymen and a considerable number of naval experts who hold that the day of the battleship, if not entirely past, is on the wane, and

that hereafter aircraft will challenge the ability of battleships to control the sea and indeed may supplant surface ships in the execution of this duty, or at least relegate surface navies to roles of relatively small importance. These predictions are based on the admittedly great improvements in aircraft during the last 20 years; they cannot be dismissed merely by pointing to the comparatively minor achievements of naval aircraft during the World War.

To illustrate this argument for the air, let us assume another European war to exist, with Great Britain and Germany on opposite sides. Let us also assume that Germany's air force is much stronger than Britain's, and that the British enjoy great superiority in sea power. In these circumstances Great Britain would be faced with the same naval objective as existed in the World War, that is, control of the North Sea, the English Channel, and other waters around the British Isles.

Strong advocates of aircraft might argue that under these conditions, control of these waters would be impossible by means of the naval dispositions which served during the World War. These persons might claim that, since Scapa Flow is but 475 miles from Helgoland, it would be untenable as a base for the British fleet; that naval patrol of the North Sea would be prevented by German aircraft; that by the same means the English Channel would be kept clear of British shipping; and that control of the waters around the British Isles would pass to Germany by reason of her superiority in the air. If we grant all of these claims, we should have to admit that England soon would be forced to sue for peace, thus leaving her allies to cope with German armies at the seat of land warfare in Europe.

HISTORICAL ANALOGIES

Before accepting predictions such as these, however, let us look backward and see if we can find analogous situations.

In 1872 Sir William Armstrong, a noted British artilleryman, expressed the opinion that it was impracticable to provide battleships with armor heavy enough to resist the attacks of guns soon to become available. He advocated, accordingly, that battleships be done away with and that they be replaced by smaller, swifter vessels either unarmored or with very thin armor. Yet some 30 years later, in spite of the great advances in artillery during this period, there were few perforations even of mediumweight armor in either of the fleet engagements of the Russo-Japanese War. Sir William not only had overestimated the potency of the gun but also had failed to foresee the possibility of major improvements in the quality of armor. Moreover, he had reached the unsound conclusion that control of the sea can be achieved by ships of weak defensive qualities in opposition to fewer units of superior defensive ability.

About 1875 the appearance of the automobile torpedo was hailed by all navies. Torpedo tubes were adopted as standard fixtures of battleships as well as of most other surface ships. From that day to this,

however, no battleship has obtained a torpedo hit on an enemy vessel, though each ship of this type has carried from two to six tubes.

During the 1880's a school of thought, called the *jeune école*, arose in France. This school held that battleships were obsolete and should be supplanted by small, swift ships designed for specialized duty. The torpedo was to be the principal weapon of many of these small craft. These views were so strong in France that they caused that country to lose its position of near-equality to Great Britain in sea power as measured by numbers of large seagoing war vessels. France went in for large numbers of torpedo boats which in service proved unseaworthy and generally unsatisfactory. About 25 years later, torpedo craft were of practically no value to either Russia or Japan in the two great fleet engagements which determined the control of the sea.

The proponents of torpedoes during the final quarter of the last century did not err much in their judgment of the destructive effect of a torpedo hit, for all ships of this period were extremely weak against this form of attack. The torpedo enthusiasts, however, did underestimate the difficulty of getting torpedoes home upon the units of an enemy fleet. Even today, when we have reliable and seaworthy torpedo craft and torpedoes of long range, it is very difficult for any surface vessel to secure a hit on an enemy ship. At the Battle of Jutland, for example, the 61 German destroyers present were able to get in just one torpedo hit on a British vessel. The *Marlborough*, which received this hit, remained in action and subsequently reached a home port in safety.

The foregoing analogies indicate the tendency of even well-informed naval experts to underestimate the difficulty of driving home an attack with new weapons and the possibility of developing countermeasures of defense. In the face of the present threat from the air we might conclude that similar errors in judgment are being made by those who advance extreme claims for the part which airplanes will play hereafter in naval warfare.

NEGLECT OF OLD WEAPONS

Yet, lest we be too hasty in dismissing the airplane as of little or no importance at sea, let us not overlook the parallel tendency to neglect weapons which have become familiar through long use, particularly if the weapons be rather unspectacular in nature.

Thus the submarine mine, which had been very effective in the American Civil War and particularly so in the Russo-Japanese War (Japan lost two battleships in a single night from contact with mines), was not the cause of much concern to naval powers in 1914. The offensive possibilities of mines had not been explored

Opposite. The aircraft carrier U.S.S. Saratoga. Below. Plane approaching carrier deck



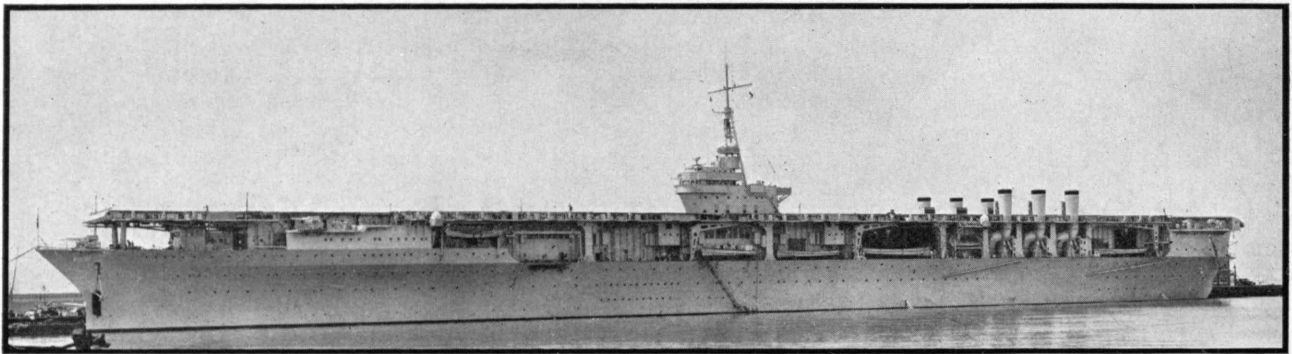
A. W. Dunning, '32

fully, while defensive measures against them had been neglected. The experiences of the World War served to refresh men's minds about the potency of these hidden menaces to all surface and submarine craft. The collapse of the Gallipoli campaign is attributable largely to the use of mines by the Turks.

The submarine is another example of the neglect of familiar means of offense. This type of war vessel has had a long and checkered career. Used first by the United States in the War of Independence, it has offered a fruitful field to inventors all over the world. Prerequisites to the practical development of this type, however, were the automobile torpedo, the electric motor, the electric storage battery, the periscope, and the internal-combustion engine. It was not until the early years of this century, therefore, that submarines were taken as seriously as naval vessels. Even then the technical

The second means of attack, the bomb, may be classified broadly into two groups: (a) the armor-piercing bomb, which has a very heavy, strong case but only a small charge of high explosive; (b) the demolition bomb, which has a light case and a large charge of high explosive — perhaps as much as 50 per cent of the total weight.

The first type of bomb is intended to penetrate the armored deck of a battleship and then explode. To succeed in such an attack the bomb must be very heavy — at least 1,000 pounds in weight — and must be dropped from a height of perhaps 20,000 feet or more. Hence even though the plane be large, the number of bombs must be small and the percentage of hits very low indeed. Furthermore, no damage will be done unless a direct hit is scored. It is to be noted that even if a hit is made on a battleship by a bomb dropped from a height



U.S.S. Ranger, the newest aircraft carrier now in service

United States Navy

troubles to which they were subject were so great that development was slow. Just before the outbreak of the World War few naval officers had great confidence in submarines. At that time no naval power was prepared either for adequate defense against submarines or for their full offensive use. But a few years later the greatest naval power of them all was almost brought to her knees through attacks of submarines on her commerce.

Manifestly, in the light of such experiences it would be foolhardy for any naval power to dismiss lightly the predictions of proponents of aircraft. Rather it would seem wise to weigh these predictions with care and to bend every effort toward the maximum offensive use of aircraft and the most effective defense against them.

MEANS OF ATTACK FROM AIR

The principal means whereby aircraft may attack surface ships are torpedoes and bombs.

Since a modern torpedo weighs from a ton to a ton and a half, planes of large size are required for torpedo attack. At present a plane may be expected to carry but one torpedo. To launch it, the plane must come close to the surface of the sea and within perhaps 10,000 yards of its enemy. Thus the plane presents a rather easy target and runs great risk of destruction by gunfire. At the same time the surface ship has the opportunity to dodge the torpedo by changes in course or speed. It may be said parenthetically that the dodging of torpedoes, as demonstrated by Jellicoe's battleships at Jutland, is by no means impracticable.

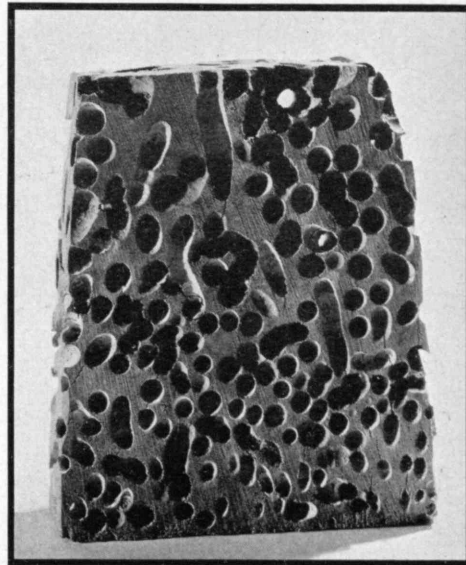
of 20,000 feet, the ship is unlikely to be disabled, for it is equipped with at least two armored decks, both of which must be penetrated before vital parts are reached.

The second type of bomb, the demolition bomb, may be dropped from a height as low as that to which the plane dares to descend. This probably will not be less than 10,000 feet * if the target ship has efficient anti-aircraft guns. In case of a direct hit upon a heavily armored ship, the damage will be less severe than that caused by an armor-piercing bomb. On the other hand, near hits will do damage to the underwater hull of the ship, similar to, but less extensive than, that caused by a torpedo hit.

UNDERWATER EXPLOSIONS

To understand the kind and extent of damage inflicted by a torpedo hit or by a demolition bomb landing near the side of a surface ship, one must consider the detonation under water of a charge of high explosive. The conversion of the explosive into gas at high temperature and pressure is not instantaneous. It progresses at an extremely rapid rate outward from the detonator, which is near the center of the charge. When the surface of combustion reaches the case of the charge, a violent blow is delivered to the surrounding water with the result that an elastic pressure wave is set up in the water. This wave travels out (*Continued on page 136*)

* Under favorable weather conditions the plane may use dive-bombing technique, by which it approaches much closer to the target and relies on the elements of surprise and speed for its chance of survival.



M. I. T. Photo

FIG. 1

Work of teredos. A block cut from damaged wood. Average diameter of the holes is about $\frac{1}{4}$ inch. Note the white, limy lining. The passages do not intersect

They Attack Wood

Living Agencies of Timber Destruction

BY CHARLES H. BLAKE

THE ACTIVITIES AND DISTRIBUTION OF FUNGI, TERMITES, POWDER-POST AND DEATHWATCH BEETLES, OF THE SHIPWORM, THE GRIBBLE, AND THE CARPENTER ANT

TERMITES and the other organisms that destroy wood may be thought of as causes of timber diseases. Following out this simile one might import into the discussion many medical terms: diagnosis, prophylaxis, and therapeusis, portal of entry, and others—even prognosis. I am here concerned particularly with causation, diagnosis, and the effects of environment. I venture to suggest that in the future the details of environment will assume increasing importance as indicators of danger from wood destroyers, especially subterranean termites. In this article, attention will be confined chiefly to the living organisms destroying wood in North America. For practical reasons I shall further confine myself to those agencies which cause deterioration or destruction in sound wood and shall ignore those which are able to cause only further damage to wood already injured.

The types of wood-destroying organisms found in the tropics are the same as those of temperate regions. I know of no additional types there. Wood is destroyed faster in the tropics because there are more individual organisms at work and, due to higher temperatures, they work longer and faster. The working season in our latitude may be five to seven months a year, while

in the tropics it will be a full year. Heated houses, however, simulate tropical temperature conditions.

In addition to the formal zoölogical and botanical classification of the wood-destroying organisms, there are a number of other classifications which may be used,

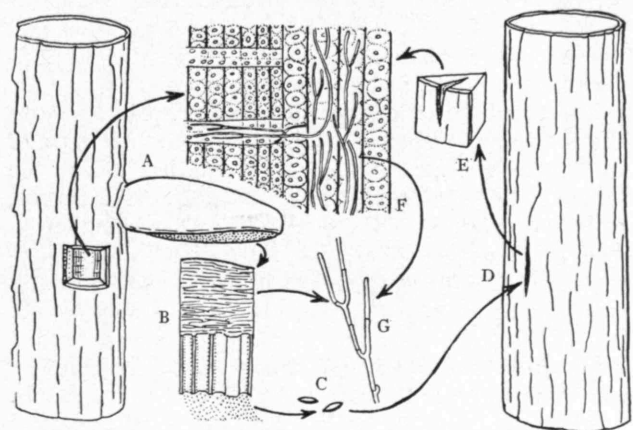


FIG. 2

Life history of a bracket fungus. A. The fruiting body on a tree. The window in the tree shows where the vegetative threads are hidden. (F shows these threads in a wood section, very highly magnified.) B. A vertical section through the fruiting body (magnified) to show the flesh above and the tubes below. Each tube is lined by a spore-producing surface from which the spores fall. C. The spores very highly magnified. D. The spores enter the deep check shown here and give rise to a new set of vegetative threads. E. Part of the same check as in D to show that it extends through the bark and into the wood itself. F. The vegetative threads in a wood section. G. The threads isolated from the wood and more highly magnified

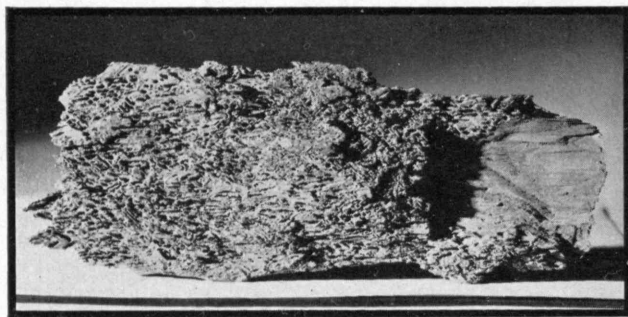


FIG. 3

Gribble work. This specimen is about $\frac{1}{2}$ inch thick with a sound back surface. The holes are nearly parallel to the outer surface and about $\frac{1}{16}$ inch in diameter

and three of these are employed in the present article. The first is environmental: Is the wood surrounded by sea water, fresh water, or air? The second depends on the use made of the wood by the organisms. The third, illustrated by the beetles, is based on the persistence of attack by a given species of insect.

Attack in sea water, as by the gribble and the shipworm, is, of course, well known. So also is attack on wood in air by fungi, termites, beetles, and so on. Attack on wood in fresh water is rare and unimportant. I have heard of but two cases, one in the Great Lakes due to larvae of caddis flies and another in Siam due to nymphs (young stages) of May flies.

The various organisms utilizing and consequently destroying sound wood fall into two use groups. The first of these contains those which obtain nourishment from the wood. Hence their interest is primarily in the chemical composition of wood. Such are the wood-destroying fungi, the termites, the powder-post beetles, and the deathwatch beetles. The second group uses wood largely because of its physical qualities. Such organisms find in wood a substance adapted to excavation and hence suitable as a dwelling place. Here we find the shipworm, the gribble, and the carpenter ant.

The fungi that decay wood belong predominantly to the mushroom group and particularly to that part of the group which produces as its fruiting bodies the familiar shelf, or bracket fungi (Fig. 2).^{*} Lumbermen call these fruiting bodies conks. They are common on trees and stumps, and are pore fungi, that is, the under-surface of the bracket consists of the mouths of many small tubes arranged in the fashion of a honeycomb. The spores from which new plants will come are formed inside these tubes. They may drop from the tubes and be carried from place to place by the wind or by animals.

The actual damage is done by a less familiar part of the fungus, a quantity of fine, whitish threads which permeate the wood, following the tubes in it and dissolving the wood substance. By this means the fungus secures the food necessary to produce more threads and, eventually, the fruiting bodies. Since the fungus also needs water, it is evident why really dry wood does not decay. These fungi naturally attack exposed wood, even in living trees, and almost any piece of lumber is likely

^{*} I am greatly indebted to Professor Irving H. Cowdrey, '05, and to the New England Museum of Natural History for the generous loan of specimens of injured wood.

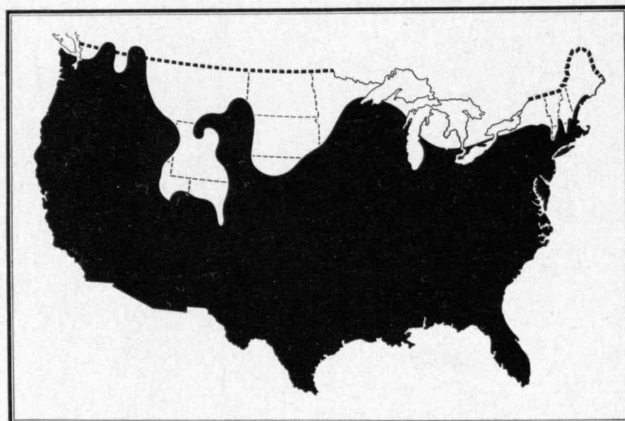


FIG. 4

Distribution of subterranean termites in the United States and Canada shown by the black area

to be infected but not necessarily damaged. The infection may lie dormant a long time if the wood is not damp enough for growth of the fungus.

While probably all of the timber woods in common use in North America are attacked by fungi, some are far more resistant than others. Heartwood is in general more resistant than sapwood. It is also of interest that some fungi (the building *Poria*, for example) attack many kinds of wood, while other fungi are restricted to attack on one or a few kinds. The same sort of differences may be found in the case of insect attack.

Turning to the animal agencies we begin our consideration with the shipworms (teredos and their close relatives). These are oddly shaped clams, whose shells cover but a small part of their bodies, leaving uncovered the very long neck. The shipworms attack only wood which is nearly or quite continuously submerged in sea water (very rarely brackish water). Adult teredos in the vicinity discharge swimming young, some of which may be fortunate enough to make contact with a wood surface in a short time. Into this they bore, using the two shells. As the hole deepens, the animal grows its neck just fast enough so that the tip stays at the surface of the wood. Through this neck the shipworm takes in food, water, and oxygen and through it also discharges

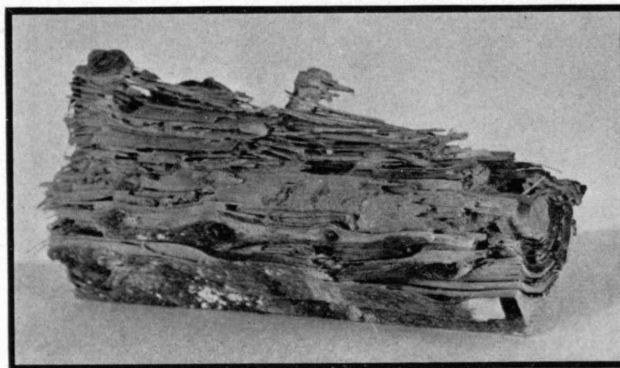


FIG. 5

Work of the eastern subterranean termite in the sill of a house. Note the concentric arrangement of the passages due to leaving the harder summer wood in each annual ring. The knots are also not attacked

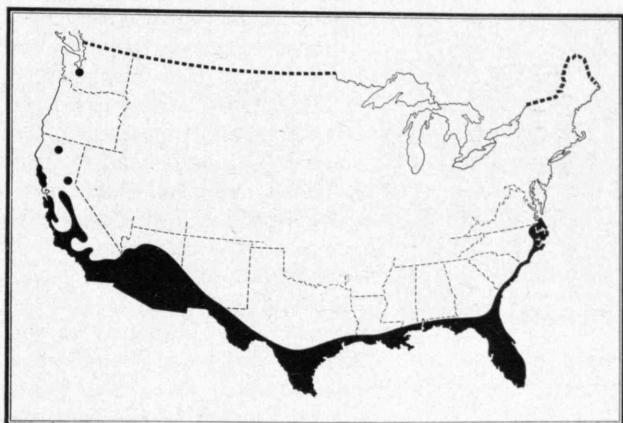


FIG. 6

Distribution of dry-wood termites in the United States shown in black

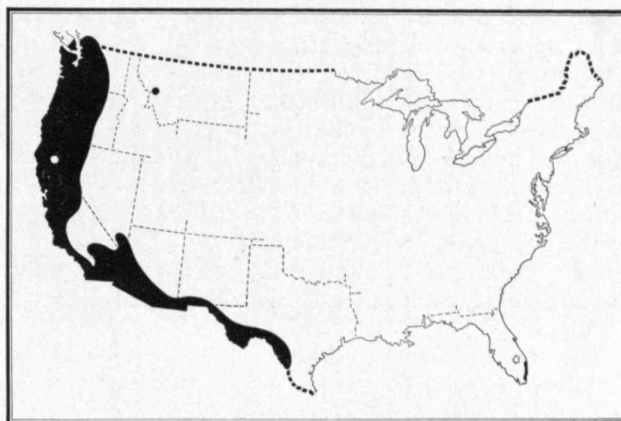


FIG. 7

Distribution of damp-wood termites in the United States and Canada shown in black

wastes, including the excavated wood. Tereido work may be recognized by the limy lining of the hole in the wood (Fig. 1). The numerous sorts of shipworms occupy as a group the temperate and tropical seacoasts of the world. So far as known no wood is immune to their attack if they are given time enough. Another group of clams, *Martesia* and the other piddocks, may have a more local significance in the infestation of marine structures.

The other important wood destroyer in the sea is a somewhat shrimplike, gray animal about $\frac{3}{16}$ of an inch long, the gribble (*Limnoria*). As a wood destroyer it is best known in the northern seas where it bores small holes (about $\frac{1}{16}$ of an inch in diameter) in the outer half inch of the wood (Fig. 3). As this damaged wood is broken away, the animals bore into the fresh wood underneath. The exact food of the gribble seems to be unknown. It is my personal opinion (without real evidence) that it consists of minute marine organisms and not wood. Another shrimplike animal (*Chelura terebrans*) about the size of the gribble is now attracting attention. It definitely occurs in holes in wood, but whether it can attack sound wood is not certain.

The remaining wood-destroying animals belong to that great assembly of six-legged and usually winged animals known as insects. While nearly all the wood-boring insects are terrestrial, we have already seen that some may attack wood that is submerged in fresh water, and one species—the Dutch wharf beetle—has achieved a somewhat exaggerated reputation for damaging marine structures. The fact is that this beetle uses softened and damp wood and is indifferent to the location of the wood. It may be found in damp and partly rotted timbers of buildings inland, or in wharf piles or boats where the softening is due to sea water. It is to be regarded as a secondary invader of injured wood.

By and large the most famous and important members of this group are the termites (popularly and rather poorly called white ants). Generally a termite colony consists of three sorts of individuals, each having its special work to do: First, there are the fertile or reproductive individuals who produce more termites. Second, there are the workers who chew the wood, build the nests, or excavate the galleries, and raise the young. This is a sterile type and normally the most numerous in

the colony. It is generally wanting in dry-wood and damp-wood termites, where its place is taken by the young stages of other castes. The third type is the soldier, a defensive and sterile caste, showing great development of the jaws or of special head glands.

The subterranean termites excavate dwellings which consist of passages in the earth that are connected to passages in the wood (Fig. 5). This sort is represented in North America by a number of similar species occupying practically all of the United States, a little of southwestern Canada, and southward through the tropics (Fig. 4). The ability of some of the species to range into comparatively cold climates is doubtless connected with their habit of withdrawing into the earth during the winter, whereby they are protected against the worst rigors of the weather.

I have already noted the probable importance of environmental detail in determining the liability of wood to attack by borers. The eastern subterranean termite is a good illustration. I have had the opportunity to examine scrutinously the northeastern portion of its range. A general northern boundary may be drawn which follows an average winter isotherm of about 21 degrees F. and an average summer isotherm of 65 degrees F., depending on which is the more southern. (This line is very close to Hopkins' equivalent isophane of 50 degrees.) Within this general area we find the species, almost without exception, on nonalkaline, well-drained, sandy or gravelly soils. This termite is definitely wanting on areas in New England having alkaline, or heavy, poorly drained soils.

The dry-wood termites are found in the southern United States and southward. Their range extends northward near the coasts to about San Francisco, Calif., and to Norfolk, Va. (Fig. 6). Their nests are made in sound, dry wood, often at considerable height aboveground, and passages do not extend into the earth.

The damp-wood termites attack wood which is damp but not necessarily rotted. They may attack sound wood in shaded spots or near the ground, but the nest does not extend into the earth. Such termites are found in North America west of the Rockies from extreme southwestern Canada south to Mexico, and in coastal southeast Florida (Fig. 7).

In North America the place of chief importance among insects that damage wooden structures is held by termites, while in Europe this place is taken by beetles. The most important of these pests in northern Europe is a long-horned beetle, the "house beetle," which Trägårdh refers to as "house enemy No. 1" in Sweden. It is scarcely known in this country.

The important beetles that attack wood are classified as a considerable number of species in several families. Their work agrees, however, in consisting of rather uniform, tapered holes ending at the surface of the wood in exit holes from which the adult beetles emerge. The damage is done almost entirely by the young, or grubs. The holes are largely filled by a sawdustlike wood powder called frass.

We may conveniently arrange the timber beetles into four persistence groups in order of increasing importance: (1) Accidental pests, such as larder beetles. (2) One-generation pests, or those which attack green timber but which may not finish their growth until after the timber has been seasoned and even used for building. A second generation does not occur in the same timber. Examples are certain longhorns and flat-headed borers. (3) Bark beetles, which infest only sapwood under bark. The infestation persists as long as sapwood is available under bark. Such are engraver beetles and some deathwatch beetles. (4) Permanent pests, by which attack may be initiated in barked, seasoned timber.

The more destructive families are those of the deathwatch beetles, the false deathwatch beetles, and the powder-post beetles. The members of these four families may breed generation after generation in the same piece of wood, resulting ultimately in a destruction as complete as that due to termites. Members of a few other families are also known to attack seasoned wood.

The family of deathwatch beetles is better known in Europe than in America. It received its popular name from the ticking sound made by the beetles in the wood — a sound formerly regarded as an ill omen. Both hardwoods and softwoods are injured by this family. The false deathwatch beetles (two families) are somewhat larger than the true deathwatches and work almost entirely in seasoned sapwood of broad-leaved (deciduous) trees. The deleterious activities of this family are most conspicuous in the southwestern United States. The

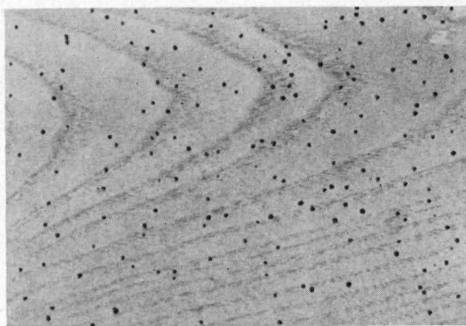
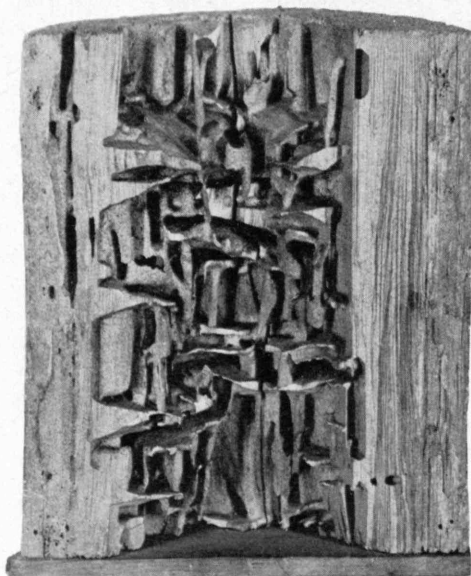


FIG. 8 (ABOVE)

Surface of an oak board infested with powder-post beetles. The exit holes are shown. They have a diameter of about $\frac{1}{16}$ inch

FIG. 9 (BELOW)

Half section of part of a pole worked by carpenter ants. The true height of this specimen is 11 inches



famous "short-circuit bug" of California is a member of one of these families. The powder-post beetles attack hardwoods only and are most frequently reported from ash, oak, and hickory (Fig. 8). Given sufficient time, practically the whole of the inside of a piece of wood will be reduced to a fine sawdust.

It is known that the food of the young of these beetles is the starch in the wood. Some work has been done abroad in attempting to remove the starch without injuring the wood. If successful, this will prevent infestation by powder-post beetles, since the females do not lay eggs in starch-free wood. Very recently an experimental apparatus has been set up in the Institute's biological engineering laboratory which may lead to a means of disinfecting small objects by the use of high-frequency radio waves.

The last wood-boring insects on our list are the wasplike insects. The most important of these is the carpenter ant — a large black ant which excavates a series of broad passageways to serve as a dwelling in wood (Fig. 9). Wood attacked by this ant is usually damp and often already somewhat rotted. Ants are easily distinguished from termites by their narrow, wasp waists. The carpenter ant is widespread in the cooler parts of North America and Europe. In addition to ants, certain other wasplike insects cause

damage. The carpenter bees, for instance, which are mostly black and as big as large bumblebees, make nests for their young in wood. Another family, known as wood wasps, or horntails, has larvae which bore in wood. These wasps are one-generation pests, and most damage from them is reported from northern Europe.

This brief review does not take account of other deleterious impingements of living organisms on engineering materials. More or less is known about the subject in its relation to electrical cables, stone brick, and concrete. Each of these materials warrants investigation.

It has been my aim in this account to draw a broad outline around the subject, coming only to the more general conclusions. One further conclusion may be drawn from the illustrations. Within rather wide limits the cause of timber destruction may be determined from the damage to the wood without isolation of the causative organism. The investigation of life histories, habits, and geographical distributions of these organisms furnishes the foundation upon which rational methods of treatment and prevention of attack are based.

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Invisible Glass

UNDER a bell jar, evacuated to a millionth part of an atmosphere, a fine wire strung between contacts glows red hot, white hot. The midsection is twisted into a little cup, in which a pinch of white powder rests. It may be sodium fluoride or lithium fluoride or cryolite or another mineral of a rather large group. Clipped in strategic positions to a frame within the bell jar are strips of glass. Unseen, the molecules of the melting powder speed through the vacuum, evaporated, and are laid down in an imperceptible, transparent film upon the strips of glass. The thickness of the precipitated layer is controlled within extremely delicate limits by conditions maintained inside the bell jar and by the time of precipitation allowed.

Remove the strips of glass after treatment and they seem little changed, except that they are more difficult to see. A strange change, however, has occurred in what they do. Whereas before treatment each surface of the glass reflected four per cent of the light which struck it, so that only 92 per cent was transmitted, the glass which has been given a fine skin of sodium fluoride — a skin only a quarter of a wavelength of green light in optical thickness (a geometrical thickness of about four-millionths of an inch) — transmits 99.6 per cent of the light striking it. Such glass is, to all intents, invisible, for it casts back into the observer's eyes practically no reflection. Another strip, similarly treated but with a different precipitant, such as stibnite, is altered equally in the opposite direction; its powers of reflection are tremendously increased and in addition may be made selective, so that it reflects light of a certain wavelength only, transmitting other wavelengths. Thus red passes through it and green is reflected from it.

The principle involved in the elimination of reflection is that the refractive index — or measure of reflecting power — of the film can be made intermediate between that of air and glass. The reflections from the two interfaces are then of equal amplitude, and when the optical thickness of the film is one quarter of the wavelength of light, the two amplitudes cancel each other. The light that would normally be reflected is added to the transmitted light. The refractive index of ordinary glass is 1.50, so the refractive index of the film should be about 1.25. This is lower than that of any fluoride

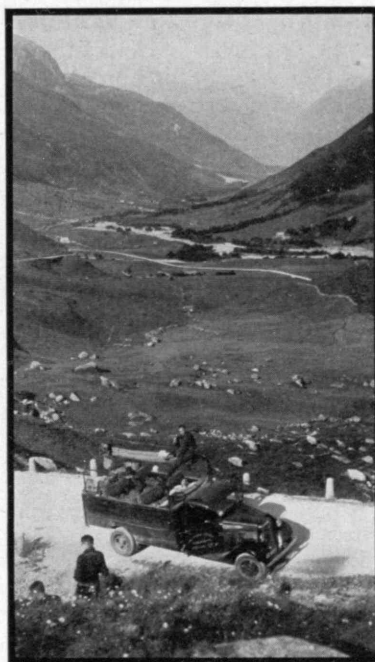
crystals, but when a fluoride crystal is deposited by evaporation, the resulting film has a lower index of refraction than that of the crystal. For example, crystalline sodium fluoride has an index of refraction of 1.33. The films evaporated in high vacuum have an index of about 1.28. If the evaporation is carried out with air present, the index of refraction of the evaporated film can be arbitrarily lowered by choosing the appropriate air pressure.

The thickness of the layer of sodium fluoride deposited determines the amount of decrease of reflection attained. Decrease of reflection of course means increase of transmission, and for some of the possible uses of the glass this increase is the important thing. For other possible uses, however, decrease of reflection — the negative side of the picture — is the end sought. The number of materials that can be deposited by evaporation is very great, and many of these materials have the desirable hardness and insolubility, as well as the desirable optical characteristics.

In optical equipment, for example, for applications in which the films now secured are of sufficient durability, the flare of lenses — that is, the creation of false images because of reflection — may well be eliminated by the treated glass. Flare decreases as the square of the reflecting power, so that a loss of ten points in reflection cuts down flare by one hundred. The practical utility of the reduction of flare is suggested by the fact that in lenses used by military aviators flare has been found to make accuracy in night bombing extremely difficult to secure.

In the fine arts, use of the "100 per cent" glass instead of ordinary glass for covering paintings will eliminate once and for all the annoying reflections that often stand between the observer and the picture he has traveled far to see. The curving glass display windows now installed by some stores, which depend upon curved surface to shoot their reflections into absorbing wells, may in due course be replaced by flat sheets of the treated glass, once means have been perfected for putting a tough skin of molecules over the flaky film which cancels reflection.

Another application at first thought far more remote than these, yet actually of possibly far greater significance, is in devices designed to receive solar energy to be converted into useful power. Here the old principle of the greenhouse comes into play. If sunlight strikes the new glass, it may



Each summer, as described on page 132, a group of Technology students make an industrial tour of Europe. Here is last summer's group climbing Furka Pass, Switzerland

be transmitted with 100 per cent efficiency into an insulated area. Some of the light waves themselves may be reflected from the receiver back through the glass; but the light that has been transformed into useful heat — long-wave radiation — cannot thus go back, since glass is opaque to waves of such length. The new glass therefore is of pronounced importance, inasmuch as it permits the trapping of all the sunlight reaching a given area, none being lost by reflection.

This interesting new development has been under way in the laboratories of the Institute's Department of Physics for some months. C. Hawley Cartwright and Arthur F. Turner, '29, instructors in that Department, have been carrying on the work with the aid of the color analyzer built by Professor Arthur C. Hardy, '18.

Dean of Architecture

A MEMORABLE reception by President Compton and the Corporation in honor of Dean William Emerson and his colleagues in the School of Architecture followed by but a few weeks announcement of Dean Emerson's retirement next autumn and the appointment of Walter R. McCornack, '03, of Cleveland as his successor. Dean Emerson has been head of the Institute's School of Architecture since he joined the Faculty in 1919 after a notable career in architecture in New York, where he had specialized in the design of bank buildings and model tenements. The reception on the evening of December 12 was expression of appreciation of the contribution he has made to Technology in the years of his administration, and served as well to introduce those attending to the facilities of the new quarters of the School, whose direction in the fall will be assumed by Mr. McCornack.

The newly appointed dean, who is noted for the design of school and college buildings, is a native of Oneida, Ill., and was educated at Knox Academy and Knox College at Galesburg, Ill., and at our own School of Architecture. Early in his career he was associated with

the late Guy Lowell, '94, in the development of plans for the Boston Museum of Fine Arts. Later he was engaged by the Worcester Art Museum for preparation of a program and preliminary plans for the museum building. One of his important contributions in the design of schools followed his appointment by the Board of Education of Cleveland to direct its \$40,000,000 school building program, which was completed in 1925. Another important project for which he was consulting architect was the Southern School Building and Industrial College Program of the Julius Rosenwald Fund.

The Board of Education of New York City in 1936 named Mr. McCornack a member of a commission of five architects to study the school building problems of New York City and to make recommendations for the improvement in planning, design, and construction methods. He has designed schools and college buildings in Illinois, Ohio, Virginia, Kentucky, and Connecticut. Since 1930 he has devoted himself principally to housing, a notable example of which is Cleveland Homes, Inc., a public works slum-clearance program.

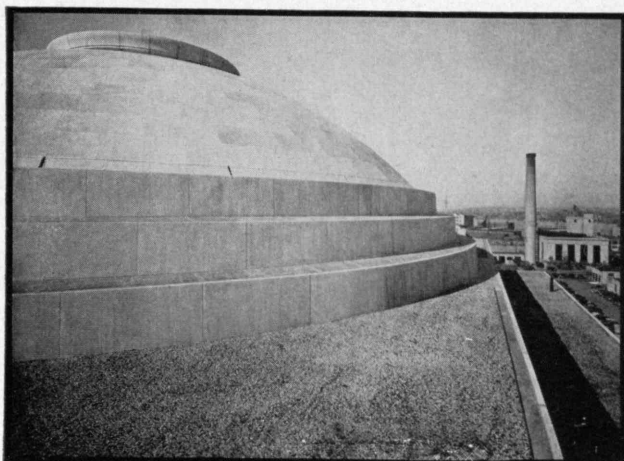
In 1932 Mr. McCornack was a member of the committee on large-scale housing of President Hoover's conference on Home Building and Home Ownership. He is a member of the United States Chamber of Commerce and of its construction and civic development committee. Active in civic affairs in Cleveland, he is a member of the city plan committee and of the building code committee. In 1937 he was appointed by the mayor of Cleveland as chairman of the board of review of the Electric Code, and he has been a member of the city's slum clearance committee since 1933.

Mr. McCornack has been a lecturer at various universities, including the schools of education of the University of Chicago, Yale University, Ohio University, and at Peabody College in Tennessee. He has also lectured at the Case School of Applied Science on the lighting problems of schools and has given a yearly course of lectures on professional practice at the Cleveland School of Architecture at Western Reserve University.



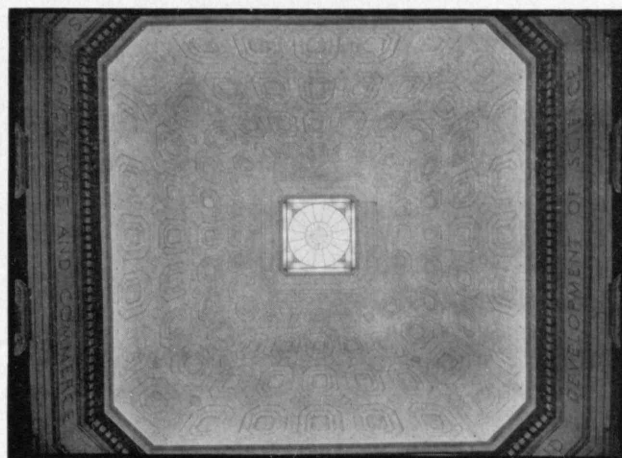
The William Barton Rogers Building impressively lighted by the afternoon sun. At a colorful reception on December 12 (see above) it was inspected by 700 guests invited to greet Dean William Emerson and his colleagues of the School of Architecture

Stone and Webster



OUTSIDE

The dome of the William Barton Rogers Building (see opposite)



INSIDE

Stone and Webster

In announcing the retirement of Dean Emerson and the appointment of his successor, President Compton, remarking on Dean Emerson's notable contributions to the School of Architecture, pointed out that "just as Mr. McCornack comes to us with an outstanding background in the field of housing, so, too, Dean Emerson, when he became head of our School of Architecture in 1919, left a distinguished practice in New York which had as one of its major emphases work in the model-tenement field. This interest in housing, Dean Emerson has never relinquished; early he foresaw the coming importance of city planning and took the steps which have led to our present effective effort in this direction; while as recently as 1934, consistent with his lifelong attention to civic responsibility, he served as chairman of the Boston Coördinating Housing Committee.

"Dean Emerson has represented the Institute with distinction in the councils of the American Institute of Architects, having been a first vice-president of that society and for many years chairman of its important committee on education.

"To the School of Architecture itself, in addition to assiduous attention to the problem of maintaining the highest grade of personnel, he has made many other contributions. He has been responsible for a splendid enriching of the library of the School and of the art collections, both through his own generosity and through his many influential connections. It was he who engendered and brought to pass the idea of the student commons room, so important a feature in the life of the architectural students, an achievement which was recognized by the students themselves when last year they offered the petition which has resulted in our new commons room being known as the William Emerson Room.

"A graduate of the École des Beaux Arts and a lifelong friend of France, during the War, Dean Emerson, as would have been expected, rendered energetic service to the Allies in France. As major and director of the American Red Cross Bureau of Construction in Paris from 1917 to 1919, he served with such distinction as to win the ribbon of a chevalier of the Legion of Honor. It was but natural that this long and stimulating contact with France should have led him to bring to our School

in succession two of the most distinguished French teachers of design who have come to these shores, Professors Ferran and Carlu. It was equally characteristic that five years ago he was one of the first to see that America need no longer look to Europe for fundamental architectural stimulus and one of the first to take the then radical step of appointing a brilliant young American as head of design.

"But an appreciation of Dean Emerson would be inadequate if it were to rest on his achievements in the academic, professional, or public-service fields. He has had a steady and continuing interest in the personal problems of his students. He and Mrs. Emerson have frequently assisted them over rocky points in their paths and have consistently cloaked these activities in anonymity. The congenial atmosphere of their home they have always extended to them. Dean Emerson has maintained an active interest in their subsequent careers, has had a unique knowledge of what each man has done, and has regularly been able to assist them to positions where their professional attainments would have greater opportunity to take effect.

"In the final analysis the test of a great teacher and a great administrator is found in the degree of coöperation and affection he commands from his staff. By this test there can be no question of the place Dean Emerson has occupied in the field of architectural education."

THE 700 guests who attended the reception for Dean Emerson and his colleagues were received in the great rotunda of the new William Barton Rogers Building, where a specially designed setting formed the background for one of the most colorful and distinguished events at the Institute for many years. Those who were invited to join President and Mrs. Compton in receiving the guests were Dean and Mrs. Emerson; Dr. Vannevar Bush, '16, and Mrs. Bush; Edwin S. Webster, '88, and Mrs. Webster; Philip Stockton, '99, and Mrs. Stockton; Charles D. Maginnis, President of the American Institute of Architects, and Miss Alice Maginnis; John T. Whitmore, '18, President of the Boston Society of Architects; Professor Harry W. Gardner, '94, and Mrs. Gardner; Professor Emeritus W. H. Lawrence, '91, and Mrs. Lawrence; and Professor F. J. Adams and Mrs. Adams.

Commonwealth of Technology

Faculty Club s.s.

The Hotel Continental Court

Vannevar Bush

Greeting
You are hereby
Summonedto be within our precinct and to appear before our justices of
The Hotel Continental Court
to be holden at Cambridge within and for our County of

Faculty Club

for uncivil business
on Tuesday, the Sixth Day of December, A. 1938
at forty-five minutes past six of the clock, in the evening
then and there in our said Court to answer a

Bill of Complaint

wherein you are charged (malavente et officio) with Premeditated
and Unconscionable Desertion and whereby an Injunction is prayed.Herein Fail Not under pains and penalties and have
you there this summons with your doings thereon.Witness *Carle R. Hayward Esquire*at Cambridge, the 26th day of November, in the year of
Compton the eighth

Attest

Archibald D. Tishken

SUMMONS

When the Faculty said its farewell (see below) to Dr. and Mrs. Bush at the annual fall dinner of the Faculty Club in Cambridge on December 6, it indicated its affectionate regard for them in a jovial mock trial in which Dr. Bush was arraigned on a charge of deserting the Institute to become president of the Carnegie Institution of Washington.

In the trial, after Dr. Bush had presented his defense, a court that was scientifically packed, by unanimous agreement found him guilty. Prosecuting Attorney William H. Timbie was pitted against a formidable array of attorneys for the defense. However, the combined cunning of law, chemistry, physics, and civil engineering represented in the qualifications of Professors Albert A. Schaefer, Earl B. Millard, George R. Harrison, and George E. Russell, '00, was of no avail. Having produced a "lie detector," an outrageously weighted pair of scales, and a slide rule, Justice Karl T. Compton found Dr. Bush guilty of desertion. As part of his sentence he is required to return to the Institute from time to time to revisit the scenes of his early endeavors. A very versatile dairy cow was the end result of the skit in which Professor William C. Greene of English and History played the part of Dr. Bush in the application of engineering to dairying.

Guests at the reception had the first opportunity to inspect the new facilities of the School of Architecture. There were several exhibitions, including drawings illustrating the history of architectural education from 1880 to the present. Another exhibition presented examples of contemporary student work, as well as models and various examples of textiles, veneers, and structural materials representing the resources of various fields from which the architect draws in the practice of his profession. The Division of City Planning had a separate exhibition presenting problems of various phases of city planning, including a regional plan of the metropolitan district of Greater Boston. There were also projects covering transportation and recreational areas.

Oasis

YOU have here an oasis in the midst of a dismal world: a domain where reason, and true accomplishment, and good-fellowship reign; where no one gives any orders — which the hard-boiled businessman cannot understand — and where it doesn't even make much difference what rules are passed by the Faculty; where there can be lively disagreement without rancor, and keen competition without disappointment; where one does for another not by com-

COMMONWEALTH OF TECHNOLOGY
Faculty Club s.s. Hotel Continental Court

OVERTURES:

And now comes the respondent Vannevar Bush, and in answer to the BILL OF COMPLAINT, deposes as follows:

1. He denies the allegation. He denies each and every allegation in said summons contained, as fully and specifically as if they were each denied. (Falsus in uno, falsus in omnibus.)
2. He defies the allegant.
3. Without waiving the generality of the denial aforesaid, he maintains that the court is inferior, incompetent, and lacking in jurisdiction over the person of the respondent. (Hare pondus domus rump; lapso ariet.)
4. Further, without submitting to the jurisdiction, the respondent will appear in person and by attorneys at the place and time designated. (Fiat justitia, ruat cælum.)
5. Respondent appoints to represent him the well known firm of Faculty Lawyers: Millard, Schaefer, Harrison and Russell.
6. Moreover, your latin is cockeyed. (Obscurus per obscurus.)

Further respondent saith not (at this time).

William Jackson
Hanc olim mentis sue juvabit.

Personally appeared before me the above mentioned respondent, Vannevar Bush, who, although well known to me, nevertheless made oath that the foregoing is true (as far as it goes).

SEAL

William Jackson
William Jackson
Notary Public

ANSWER

pulsion, not even because it results in aid given in return, but just because it is a pleasant thing to do; where the peculiarities and idiosyncrasies of us all add to the zest of life and cause no pain; where scientific generosity, that fairest flower of the day, flourishes and sheds its perfume to encourage those who accomplish and those who merely try; where the very atmosphere stifles prejudice before it is born; where youth is taught to value all these things and to hold the torch high; where much is accomplished for the welfare of mankind, and more for the great good of man's soul; where honors rest lightly and disappointments evaporate with the advent of every spring.

"You have an oasis, presided over by one who exemplifies these virtues in his every act. Long may you regard it as a holy place."

With these words Vannevar Bush, '16, said formal farewell to his Institute colleagues at the fall dinner of the Faculty Club last month (see illustrations adjacent), describing truly and simply the spirit of Technology to which — as no one realizes better than those colleagues — he himself has contributed so greatly as teacher, administrator, and man.

Though the meeting was one of farewell, it was also one of celebration — celebration to take the edge off regret, and celebration to express the pride Dr. Bush's associates feel in his selection for so distinguished and influential a post as that of president of the Carnegie Institution of Washington. It was, in the round, the best Faculty Dinner we have attended — the best conceived, the best in friendly spirit. Dr. Bush's talk reflected that spirit and voiced it in terms of a charter and an assurance for the future.

Alumni Aid in Student Selection

BY B. ALDEN THRESHER

Director of Admissions

IN an institution such as Technology, the Alumni form an important part of the machinery for the selection and admission of students. The keymen in this work are the 175 Honorary Secretaries in cities throughout the United States and in some 20 large foreign centers.

The Honorary Secretary is an Alumnus carefully selected by reason of his loyalty to the Institute, his standing in his community, and his interest in young men. Each Honorary Secretary is appointed directly by the President and holds office for a five-year term. His function is to serve as a local point of contact with prospective students and with the schools in his community. He talks personally with candidates for admission, advises them in the light of his own Institute background and subsequent experience, and supplies to the Admissions Office comments upon their apparent promise as Technology students.

The Admissions Office receives inquiries from a very large number of prospective students each year. In practice, it proves impossible to distinguish purely casual inquiries from those which sooner or later result in a bona fide application for admission. For this reason, *all* inquiries from each district are referred to the appropriate Honorary Secretary. A letter replying to the inquiry and sending information about the Institute goes to each correspondent, referring him to the local Honorary Secretary. A copy of the answer is sent to the latter, so that he will be informed of all inquiries originating in his territory. It is made clear to the student that, should he decide to apply for admission, he is expected to take the initiative in arranging a conference with the Honorary Secretary. This Alumnus cannot be expected to serve as a scout to hunt up prospective students. His function is to aid in the selective process, by which the most promising candidates are chosen, not to act as a recruiting officer. It has nevertheless proved desirable to inform the Honorary Secretary immediately of inquiries in his territory, so that he can look up the student if he wishes to do so.

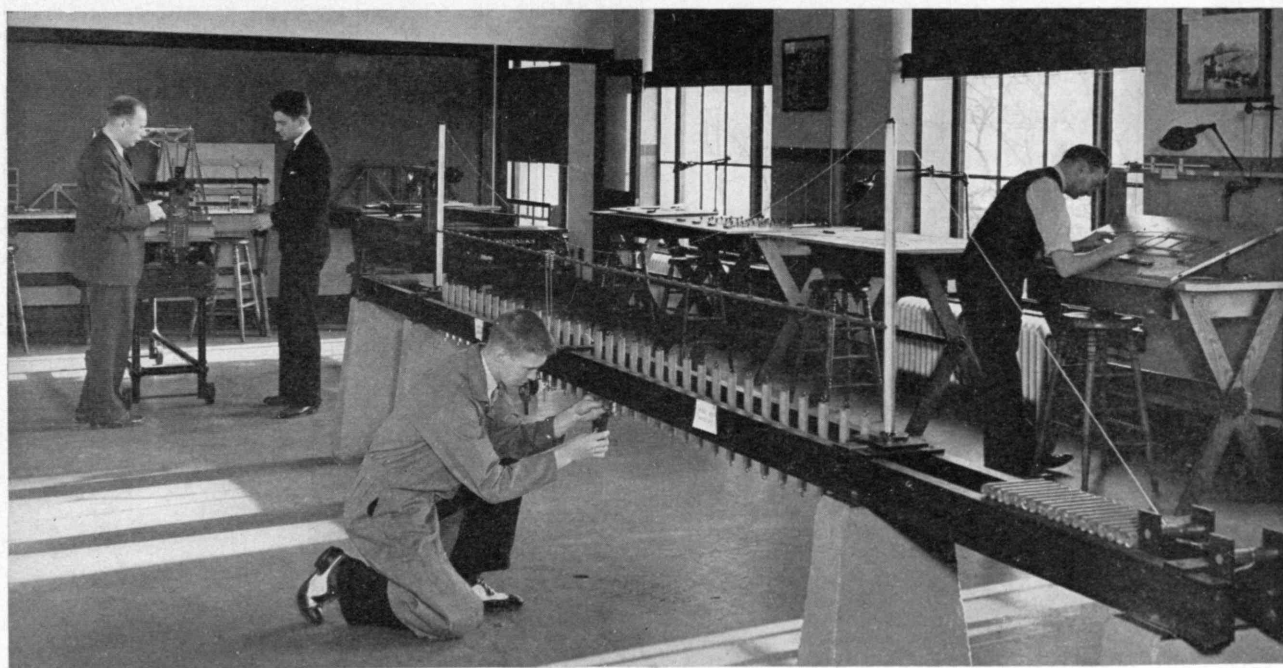
Letters from the Honorary Secretaries now constitute an important part of the whole body of evidence available to the Committee on Admissions in selecting the candidates to be accepted for the entering class. Such letters reflect the mature judgment of men experienced in appraising human nature. They form an invaluable supplement to the record of scholastic achievement and to the other evidence available on each candidate.

The Honorary Secretary is not expected to be a source of detailed information about entrance requirements and other details, nor is he expected to make, on behalf of the Institute, commitments regarding admission or the award of scholarships. He can, however, through

his contact with the schools and through conferences with students, serve as a focal point of general information and of selective judgment in the community. He provides a home-town opinion on candidates. With the growing geographical diversification of the student body, the Honorary Secretary is a chief means by which the Institute keeps its roots established in every section of the country. Many other Alumni, though not officially a part of the selective organization, have rendered important service by talking with boys of exceptional promise, advising them, and putting them in contact with the Institute.

The selection of candidates for freshman scholarship awards is another important activity by which many Alumni, and especially the officers of alumni clubs, aid Technology. In 18 large centers there are now alumni regional scholarships. These are awards of full tuition for the freshman year. Candidates are selected upon recommendation of committees of Alumni in each city. Meetings of these committees, before which applicants appear for personal conferences, are held each spring. The caliber and subsequent performance of the holders of these awards testify to the care and good judgment of the alumni committees which have recommended their selection. These committees likewise aid in the award of the numerous freshman competitive scholarships of part tuition in varying amounts.

The splendidly effective work of the Alumni in these fields indicates that Technology is far more than a group of buildings and a staff: It is likewise an idea embodied in its Alumni, who play a vital part in perpetuating the spirit and ideals of education in science. Since roughly one-third of the entire student body (including the Graduate School) is new each year, the selection of the best candidates is of paramount significance. The



M.I.T. Photo

TO STUDENTS, AS WELL AS ENGINEERS, THIS IS HELPFUL

The Department of Civil and Sanitary Engineering's laboratory of structural analysis (The Review, February, page 184) has been outstandingly successful as an aid to teaching, and in addition, as a research tool. In the foreground above is a suspension bridge model under study

reservoir of experience and judgment available for this purpose in the alumni body is an asset which the Institute will continue to utilize, thanks to the wholehearted coöperation which the Alumni have offered as the system has been brought to its present development.

Technology's European Envoys

LAST summer ten Technology students and a fellow student from Middlebury College spent about ten weeks traveling 5,500 miles through ten European countries on what has proved to be an eminently successful mission of good will. The occasion was the sixth annual industrial tour of Europe, conducted by Technology's Department of Business and Engineering Administration with the generous assistance of the Thorne-Loomis Foundation, Inc., of New York City (Alfred L. Loomis, banker, physicist, and life member of Technology's Corporation).

When started in 1933, the purpose of the tour was twofold: First, a select group of students would be given a unique opportunity to study industrial conditions in European countries through a series of prearranged plant visits designed to reflect representative industries and practices in each country visited. The second purpose was to acquaint students with the cultural and historical resources of the older civilizations of northern Europe.

Six successful tours have demonstrated that a third purpose is of major importance. Apparently without exception the visit of the group is anticipated with friendly interest and pleasure in every city and town along the way. Technology men living abroad have been extremely coöperative in providing for the students' needs. Fully as gratifying has been the genuine desire of non-Alumni to aid the group in every way possible. During the past summer more than 40 men and women having no formal connection with the Institute put themselves to some trouble and expense in providing assistance or entertainment, for which the students were most appreciative. Daily, of course, countless questions must be answered about American customs, ideals, and politics, and of life and work at Technology. In effect the students have come to be regarded as ambassadors of international good will.

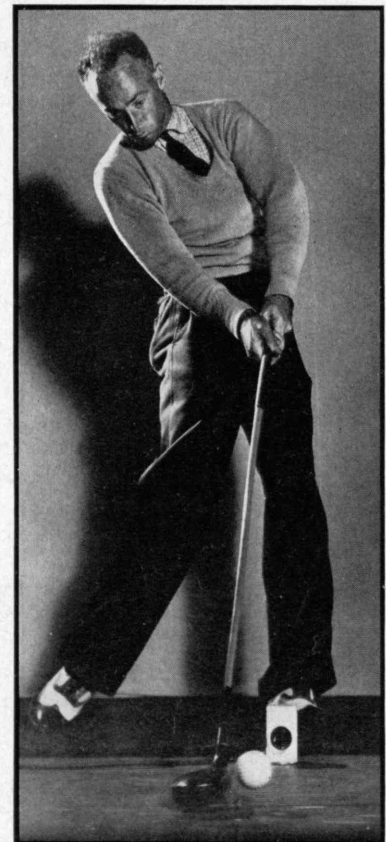
The trip is made in a bus, fully equipped for sleeping, cooking, and long-distance travel, provided by the Thorne-Loomis Foundation. Out-of-pocket expenses only, consisting primarily of gasoline, oil, insurance, provisions, and steamship fare, are borne by the students. Countries visited last summer were England, Scotland, Norway, Sweden, Denmark, Germany, Switzerland, France, Belgium, and Holland. A total of 26 industrial plants was visited, as well as numerous points of historical, cultural, or scenic interest in each country. Departments of the Institute represented in the group were Electrical Engineering, Metallurgy, Naval Architecture, and Business and Engineering Administration.

Tentative plans for the coming summer involve essentially the same itinerary and duration of time as last year, which the students found highly satisfactory. A new feature is contemplated, however, which is expected to add materially to the success of the tour.

Following an experiment tried in Sweden during a previous trip, a qualified student from each of several of the countries visited will be invited to accompany the group during the period of visit to his native country. In this way possible language difficulties will be avoided; the students will have full opportunity to ask questions; matters of interest not readily apparent to the visitor may be pointed out; and the group will be off to a head start toward learning the ropes in the country visited.

Also for the first time the tour will be organized and run by a group of students and recent graduates, including Allen W. Horton, Jr., '36, who have made the trip in past years, while the Department of Business and Engineering Administration will contribute any

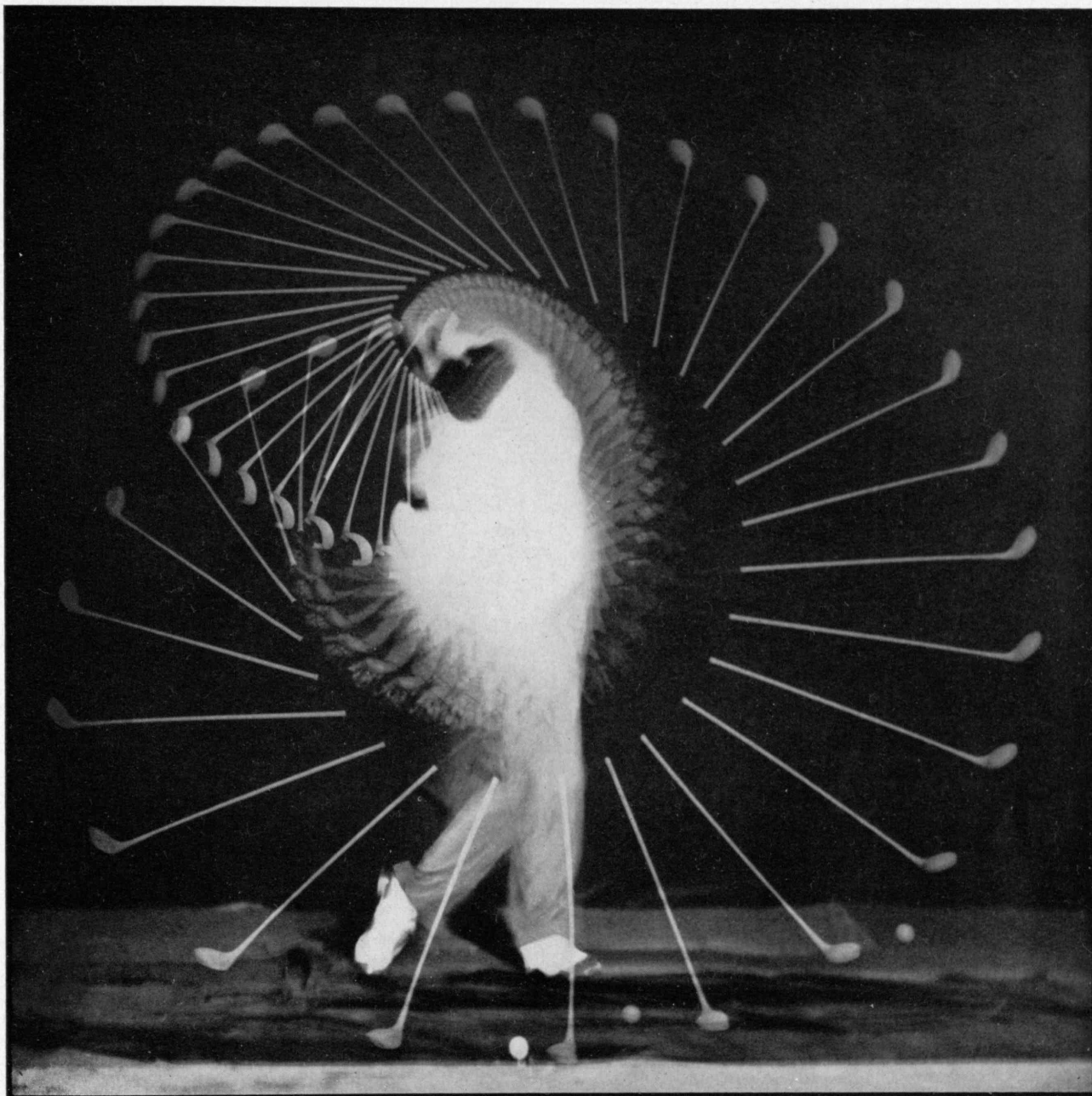
RHYTHM
SPEED
CONCENTRATION
CONTROL
*Densmore Shute
follows through
(see next page)*



necessary services and guidance. Thus, both valuable firsthand experience will be available when plans are made and a broader recognition will be accorded the success which earlier tours have enjoyed, the favorable publicity and interest in the Institute which they stimulate, and the expressed desire of students in all Departments to participate.

Recognition

ANNUAL awards of two professional societies are currently made to members of the Institute Faculty whose contributions to their fields of endeavor during 1938 have been distinguished. To Alfred V. deForest, '11, of the Department of Mechanical Engineering will go the Sylvanus Albert Reed Award of the fellows of the



THE ARC OF THE SWING

Professor Harold E. Edgerton, '27, has added to his repertory of high-speed photography a new multiple-image technique which makes possible photographs such as the above study of a golf stroke executed by Densmore Shute, the well-known professional. The successive images of the club and ball are separated by intervals of one-hundredth of a second, show the bending and twisting of the club and the entire course of the swing. On the opposite page is a single-image photograph taken just after impact. Note the bent shaft of Mr. Shute's club

Institute of the Aeronautical Sciences. To Erwin H. Schell, '12, Head of the Department of Business and Engineering Administration, has been awarded the Gilbreth Medal for 1938 of the Society for the Advancement of Management.

Professor deForest, who will receive his award at the annual meeting of the aeronautical institute in New York late this month, was chosen as recipient for his development of the Magnaflux method for testing metals. This magnetic testing method grew out of the observations of William E. Hoke, who in 1918 found that small iron particles tend to collect on cracks in

magnetized steel parts. In 1928 Professor deForest investigated the phenomena of local magnetic poles and found that by using heavy currents through the material, the sensitivity of the test could be greatly increased. At the same time, more suitable magnetic powders for locating the poles were developed. This method makes it possible to detect forging defects, and fatigue and grinding cracks. It is also applied for the discovery of nonmetallic inclusions and small seams on, or below, the surface of the metal, as well as for locating defects in welds, particularly in airplane construction. The ability of the test to locate nonmetallic inclusions has



M.I.T. Photo

IN THE GRADUATE HOUSE

The main dining room where graduate students and Faculty may dine. Several other dining rooms are available, and noon finds many members of the staff joining the graduate students in the use of these facilities and the pleasant lounges

led to important improvements in the manufacture of steel for critical parts of engines and propellers. The Magnaflux test is almost universally applied for re-examination of engine parts at overhaul periods. In addition it is also used for railroad and automotive tests, and for examination of welded pressure vessels and tanks in the oil industry.

The Gilbreth Medal, presented to Professor Schell, is awarded annually to that person who, in the opinion of the judges, has rendered an outstanding contribution to the field of industrial engineering and management. Professor Schell is the author of two outstanding texts, "The Technique of Executive Control" and "Administrative Proficiency in Business," and has long been interested in training young men for the responsibilities of management in business and industry. Besides his books he has written numerous outstanding and progressive articles which have, through the years, constituted a series of important contributions to the science of management. Announcement of the award was made at the recent annual conference of the Society for the Advancement of Management, held in New York.

Popular Science Lectures

THE first of the annual series of Popular Science Lectures sponsored by the Society of Arts was given on December 11, when Charles S. Draper, '26, Associate Professor of Aeronautical Engineering, gave an experimental lecture on "How a Pilot Navigates the Air." Professor Draper's lecture was illustrated by instruments, experiments, and slides showing how an airplane is navigated. The second lecture of the series, "The Approach to the Absolute Zero of Temperature," will be given by Frederick G. Keyes, Head of the Department of Chemistry, on January 15. In this lecture Dr. Keyes will show experiments of extraordinary interest, including the liquefaction and solidification of hydrogen.

On February 12, Professor Frederick K. Morris of the Department of Geology will lecture on "Rocks from the Sky." He has just returned from a year's journey

around the world, during which he made many interesting geological studies. The final lecture of the series, "Living Mechanisms and How the Exact Sciences Measure Their Functions," will be given by J. Warren Horton, '14, Associate Professor of Biological Engineering, on March 12.

All the lectures in this series are given in Room 10-250 at the Institute.

The Alumni Council

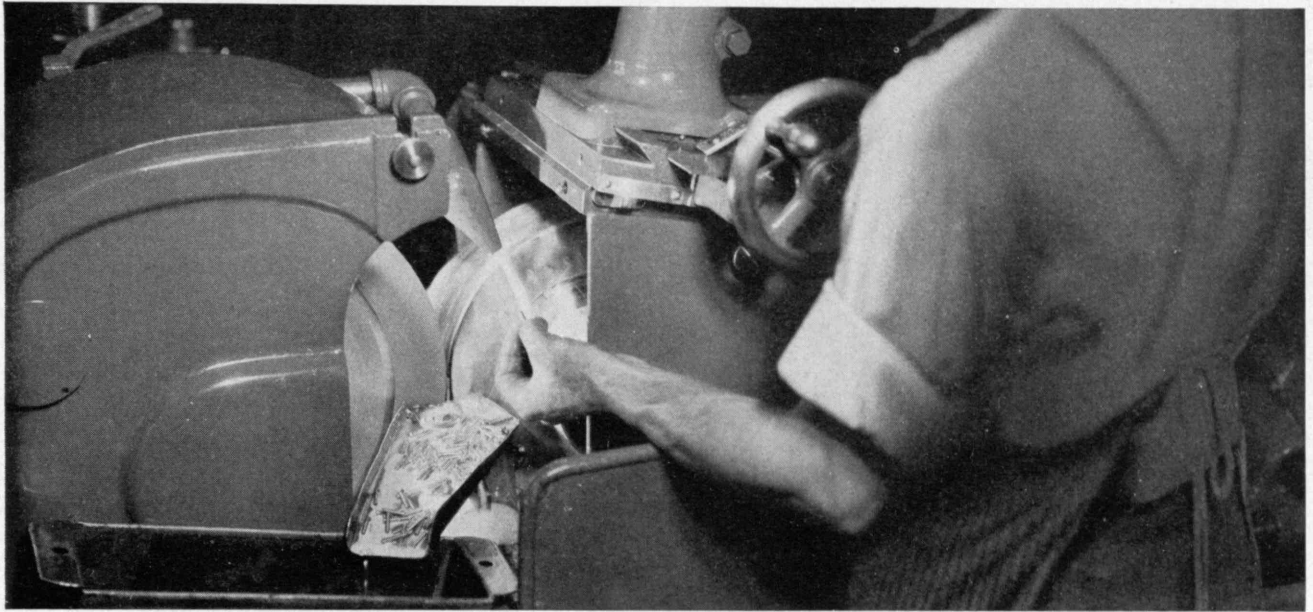
AS the parliament of the Alumni Association, the Council occupies an important and responsible position in Technology affairs. That this responsibility is not expressed by more discussion on the floor of the Council has been deplored on occasion, perhaps with reason, but those who have dealt intimately with alumni affairs know that the Council does effective work even though it does not indulge in spectacular parliamentary discussion.

Its effectiveness lies in its many committees, and it is in these small groups that we see at their best the loyalty and industry of Council members. The fact that Alumni Day is operated by men who have full-time responsibilities in business and the professions is one example. Another may be found in the special committee to advise on the establishment of an annual alumni fund which reports, after an exhaustive study, at the January Council meeting. And there are dozens of others.

Lending direction and coördination to these many groups stands the President of the Association, aided by the Secretary, and we have been extraordinarily fortunate in recent years in the way successive presidents have contributed of their time and competence to the management of the Association. Last year Marshall B. Dalton, '15, carried a tremendous load in overseeing the Alumni Fund Campaign and this year Harold B. Richmond, '14, is restudying our whole organization with superb understanding of its details and objectives.

These editorial remarks are by way of preamble to a brief report on the two Council meetings held this fiscal year. Meeting for its 201st session on October 31, the Alumni Council had ample demonstration of the virtuosity of Mr. Richmond who was faced that evening with a considerable mass of business, and got it all through expeditiously as well as efficiently. His address and despatch left ample time and full attention for the guest speaker of the evening, Professor Henry E. Rossell, '15, of the Department of Naval Architecture, whose discussion of the place of the battleship in national defense evoked much and energetic discussion. Professor Rossell's remarks serve as basis for his article on the subject in this issue of The Review.

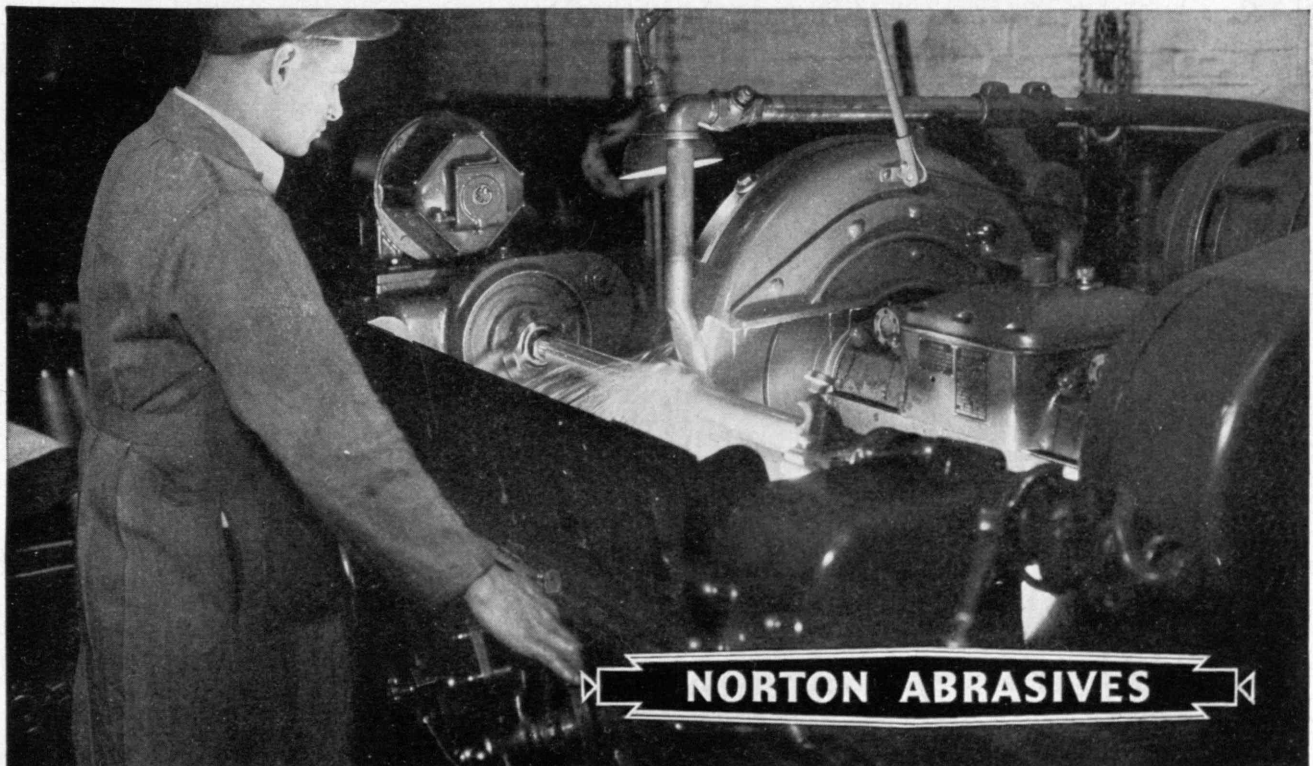
A subject in many ways related to Commander Rossell's address in October was presented at the meeting of November 28 by Professor Frederick K. Morris of the Department of Geology, who discussed conditions in the Far East, speaking both as a geologist experienced in those regions, and as a recent visitor to them. The dangers of emotionalism in thought about Asia were stressed by Professor Morris, who analyzed the present Sino-Japanese War dispassionately in terms of the economic, strategic, and (Continued on page 140)



On All Types of O. D. Grinding
The Norton "B-E" Wheel Is Breaking Records

FAST "spark out"—that's the result you can expect from the Norton "B-E" bonded O. D. grinding wheels. Try these fast cutting wheels on your centerless and cylindrical grinding operations. The patented "B-E" bond is an exclusive Norton development.

NORTON COMPANY, WORCESTER, MASS.



To get PROFITABLE PRODUCTION in 1939

• • • **Modern
Brown & Sharpe
Machine Tools
for original equipment
and for replacement
of old machines.**



Catalog on
request.

**Brown & Sharpe
Mfg. Co.
Providence, R. I.**

A wide variety of types
and sizes available . . .

**Milling Machines
Grinding Machines
Screw Machines**

BROWN & SHARPE

Simplex-ANHVDREX:-

*A new insulation for wires and
cables made from deproteinized
rubber. It has low water absorp-
tion characteristics and is ideal
for underground or submarine
power or signal cables.*

Detailed information on request.

SIMPLEX WIRE & CABLE CO

79 Sidney St., Cambridge, Mass.

NAVAL ARMAMENTS

(Continued from page 122)

radially at the velocity of sound in water and with little loss of energy. At considerable distances from the center of explosion, the pressure wave is capable of breaking through the shell of a large ship. Hence a ship with a single skin along its sides is especially vulnerable to attack by the pressure wave. A homely illustration of the propagation of a pressure wave is the juvenile practical joke of striking two stones together under water to the discomfort of a companion in the act of swimming beneath the surface.

Entirely apart from the pressure wave, an underwater explosion results in the formation of a globe of gas at great temperature and high pressure. This globe in expanding tends to vent its energy in directions of relatively low resistance. Thus if the explosion takes place near the surface of the sea, the energy of the gas globe will be expended principally in throwing into the air a large column of water. If the explosion takes place in contact with the side of a surface ship, the gas globe will vent itself both upward and inward. The percentage of energy passing into the ship with resulting damage will depend upon the resistance offered by the ship's structure and by the inert mass, such as coal, which is present near the skin of the ship. In passing into the ship the gas burns off fragments of the shell and hurls them inboard. These fragments may pass entirely through a vessel of the merchant type, and they may cause the explosion of the magazines of a war vessel having a weak defensive system against underwater attack (the *Pommern* at Jutland).

MEANS OF DEFENSE

So much for the means of attack available to aircraft. Now let us consider defensive measures, both passive and active.

The passive means of defense are essentially those used for protection of ships against torpedoes, mines, and long-range gunfire; namely, the fitting of armored decks above water and honeycombs of watertight bulkheads (partitions) along the sides below water. These defensive features are so heavy and require so much space that they can be carried in fully developed form only on very large war vessels.

In respect to passive defense against air attack, battleships and battle cruisers are very strong, cruisers are weak to fairly strong depending upon size, and destroyers and merchant ships are very weak. Airplane carriers are strong except for their extremely vulnerable flight decks and hangars.

One of the most important of the active means of defense against air attack is the large-caliber anti-aircraft gun (four or five inch) with mechanical control and with accurate range- and direction-finding instruments. This gun has a rapid rate of fire — one round about every four seconds — and its projectiles upon bursting deliver a strong blast which would be extremely uncomfortable to aviators and highly dangerous to planes.

Against airplanes which venture too close to their targets, machine guns, operated as one squirts a hose, offer a valuable active means of defense. Some of these guns fire explosive projectiles (Concluded on page-138)

They can't talk those telephones to death

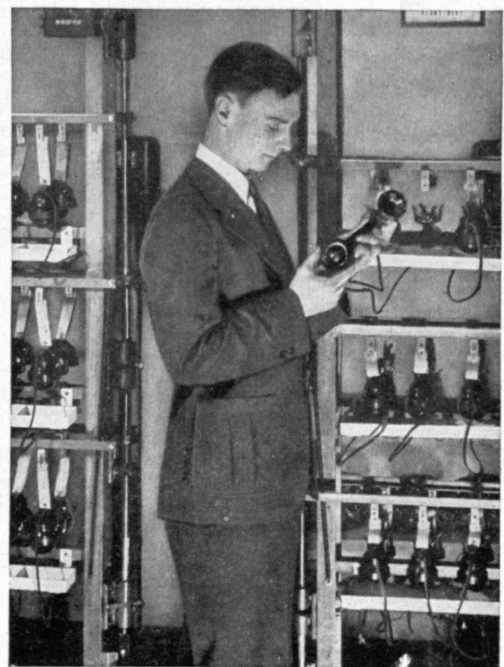


*... because Bell telephones
can "take it"*

Every piece of apparatus used in making a telephone call must pass many tests at Western Electric, the manufacturing unit of the Bell System.

These tests begin with the raw materials and are carried through each stage of manufacture. They range from simple visual inspections to complicated chemical, electrical and mechanical tests.

And that helps to explain why your Bell telephone doesn't "let you down."



A Western Electric machine which puts telephones through their paces. Here representative samples receive a test which, in a few weeks, is equivalent to a lifetime of actual service.

Western Electric *... made your*
BELL TELEPHONE

LINGUAPHONE:

THE MODERN WAY
TO LEARN A NEW

LANGUAGE

In your own home . . . during leisure half hours . . . alone or in a group . . . quickly, easily and most pleasantly. First you LISTEN . . . then you SPEAK French, German, Spanish, Italian or any of 23 languages. Not a smattering but authoritative courses made by the world's foremost language teachers . . . used in over 14,000 schools and colleges and by thousands of men and women.

LINGUAPHONE INSTITUTE

67 R. C. A. Building

New York City

THE
Bowman
ROOM

Dancing and Entertainment at Dinner and Supper



RETURN ENGAGEMENT of the inimitable

HORACE HEIDT

and HIS BRIGADIERS

Continuous entertainment of infinite variety
and brilliance, vocal and instrumental.

SPECIAL STUDENT ROOM RATES

THE BILTMORE

Madison Ave. at 43rd St., New York Adjoining Grand Central



NAVAL ARMAMENTS

(Concluded from page 136)

more than an inch in diameter. Of importance also as active means of defense are the speed and maneuverability of surface ships. Destroyers and cruisers are inherently strong in these respects, while merchant ships in general are very weak.

And a final active means of defense is the airplane itself, particularly the pursuit plane. In this type of defense all surface craft except airplane carriers are weak. In a well-rounded fleet the deficiency, as far as warships are concerned, will be offset by carriers.

Taking account of all defensive measures, active as well as passive, we may conclude that warships on the whole are strong in defense against air attack and that merchant vessels are extremely weak.

HYPOTHETICAL WAR

Now let us assume a hypothetical war in which a strong naval power, *A*, is under the necessity of controlling the waters bounding her shores in order to safeguard the transport of troops across these waters and also to protect commercial shipping using her ports. Let us assume that the opponent, *B*, is weak in sea strength but is much superior in air power. The two countries are removed from each other, let us say, by only a few hundred miles of sea. The question is: Could *A* control the waters adjacent to its shores in the face of *B*'s superiority in the air?

One course of action for *B* to follow would be to bombard from the air important cities within the boundaries of its enemy. This procedure would lead to substantial wastage of *B*'s air force and would have no effect on *A*'s control of the sea. Another policy which *B* might follow would be to attempt to destroy *A*'s navy by repeated air attacks upon it. This policy doubtless would be followed to some extent, but again it would lead to great attrition in *B*'s air strength and could hardly break down *A*'s control of the sea even in a prolonged war.

On the other hand, *B* might decide merely to harass *A*'s navy by occasional air raids in order to keep a large part of *A*'s air strength in attendance upon the fleet. *B* could then use the greater part of its air force in attacks upon *A*'s commerce and troop transports. Such a policy probably would force *A* to adopt the convoy system, using as escorts aircraft and light surface vessels armed with powerful antiaircraft batteries. Under these circumstances each air force might be expected to suffer losses roughly proportional to the air strength of its adversary. *A*, being on the defensive, doubtless would have a lower constant of proportionality than *B*. Nevertheless, if the ratio of *A*'s air strength to that of *B* were initially very low, the air preponderance of *B* over *A* would become progressively greater, so that *A* might find itself shortly in a critical position in respect to the protection of its commerce and troop transports.

Of course, the foregoing speculations may prove to be very far from the truth in the unfortunate event of a war such as that imagined. The uncertainties are so great, however, that a strong sea power which might possibly find itself in the position of country *A* of our example would be ill advised in times of peace to neglect its air force and its antiaircraft defenses.

ESTABLISHED 1818

Brooks Brothers,

CLOTHING,

Mens Furnishings, Hats & Shoes

MADISON AVENUE COR. FORTY-FOURTH STREET
NEW YORK

BROOKS DRESS CLOTHES

Dress clothes are a particularly good example of the many advantages presented by Brooks Brothers' styles, materials, and workmanship. Ordinarily purchased to be worn over a more protracted period than clothes for general town or country use, they should be so designed as to continue in good style — and so made as to wear satisfactorily — for an exceptionally long time. At Brooks Brothers they are . . . tailored of our specially imported English vicuna, finished with careful workmanship, cut in lasting good taste.

Dress Coat \$78 Dress Trousers \$24
Silk Waistcoat \$16 Dinner Jacket \$65 White Waistcoats \$10 to \$12

NEW DEPARTMENT FOR YOUNG MEN

Dress Coat \$50 Dress Trousers \$15
Silk or White Waistcoat \$10 Dinner Jacket \$45

BRANCHES

NEW YORK: ONE WALL STREET
BOSTON: NEWBURY COR. BERKELEY STREET



INFORMATION ON M. I. T.

THE TECHNOLOGY REVIEW BUREAU exists to supply authoritative information to anyone interested in details regarding the Massachusetts Institute of Technology. It serves as a clearing house for inquiry and aims to further the spread of exact information regarding entrance requirements, outline of courses, subjects of instruction and other information which may be of aid to the students considering undergraduate or graduate study at the Institute.

The Institute publishes a variety of bulletins, as well as a catalogue of general information essential to the entering student. The Technology Review Bureau will be glad to send, gratis and post free upon request, one or more copies of any publication listed below, or to forward any special inquiry to the proper authority.

Ask for the following pamphlets by their descriptive numbers

1: For general information, admission requirements, subjects of instruction, ask for Bulletin 1.

2: For announcement of courses offered in Summer Session, ask for Bulletin 2.

3: For information on courses in Architecture, both Undergraduate and Graduate, ask for Bulletin 3.

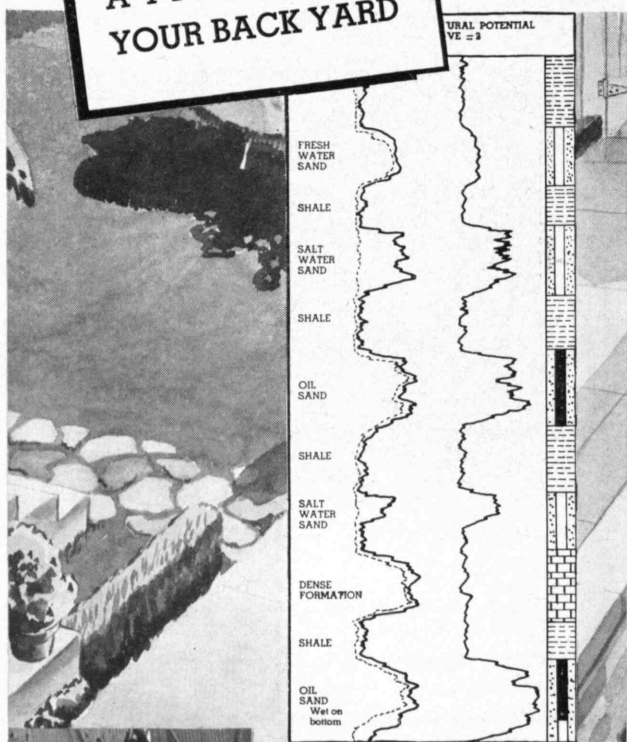
4: For a popular presentation of Educational Opportunities offered at M.I.T., ask for Bulletin 4.

All inquiries sent to the address below will receive prompt attention

THE TECHNOLOGY REVIEW BUREAU

ROOM 11-203, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MASS.

THIS MIGHT BE
A PICTURE OF
YOUR BACK YARD



Through this electrode Nature records her secrets for accurate interpretation.



1500 feet of formation is accurately charted by Lane-Wells Electrolog.



Electrolog Truck at the derrick in a busy field.

Your own back yard might look like this—to a petroleum engineer. It's true the picture isn't beautiful, but it is an accurate chart of sub-surface formations.

Accurate electrical logging of oil wells is a Lane-Wells Service which enables petroleum engineers to correlate wells and differentiate between oil sand, water sand and impermeable shale. Its development has increased many times man's knowledge of the world in which we live. Complete information of Lane-Wells Technical Oil Field Services is available through any Lane-Wells branch, or by mail.

LANE-WELLS COMPANY
Los Angeles-New York-Houston
Branches in all principal oil fields

LANE WELLS
COMPANY
TECHNICAL OIL FIELD SERVICES

THE INSTITUTE GAZETTE

(Continued from page 134)

sociological factors involved in it. The situation of the Japanese armies, he concluded, is such that they cannot be expected to hold out another year, if one judges by Occidental standards; yet since the Oriental standards must prevail, any implied prediction must be seriously discounted. Extensive discussion followed Professor Morris' talk.

Reports on last spring's Alumni Day ceremonies by Professor John E. Burchard, '23, produced discussion of plans for this year, of which A. Warren Norton, '21, is protagonist. General approval of the 1938 program was voiced during the debate, and it was felt that but slight modifications of it should be made for 1939. These would mainly affect the length of meetings.

The December meeting it was decided to omit in view of the fact that the last Monday of this month follows Christmas. At the first meeting of the new year, to be held on January 30, the question of the Alumni Fund will be principal on the agenda, with David McCord, Executive Secretary of the Harvard Alumni Fund Council, as guest speaker.

The President's Report, Part II

LAST month we presented, for those who have not received the full report, a summary of part of President Compton's last annual report to the Corporation, in which he discussed the future of architectural education. In the following summary Dr. Compton examines the curriculum, discusses desiderata, and suggests certain changes for the future.

EDUCATIONAL PROBLEMS

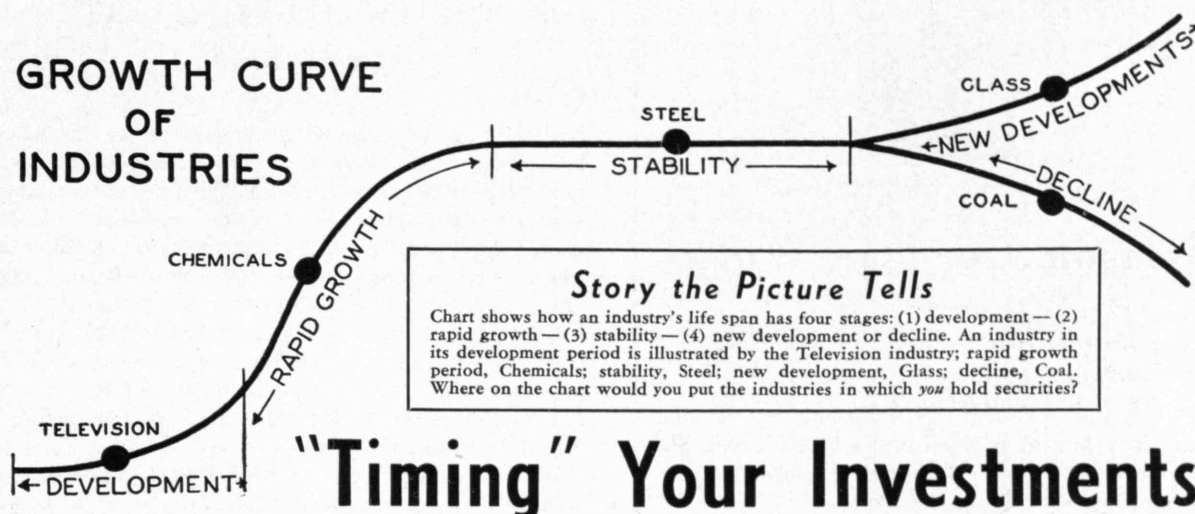
Every procedure and every curriculum should continually be subjected to search for improvement. In this sense the number of educational problems is equal to the number of educational activities, possible as well as actual. Many of our basic operations have been the subject of intensive study and reorganization during the past decade. I will now mention only three problems which, in my judgment, particularly merit attention.

A sound basis of procedure in education, as well as in engineering, business, or any other affairs of life, is to try intelligently conceived experiments and then to develop vigorously in those directions in which the experiments have been successful. In our educational program at M.I.T., two experiments have proved decidedly successful, the coöperative courses and the honors courses. Should not the scope of their operations therefore be extended?

COÖPERATIVE COURSES

As coöperative courses I include not only our courses thus designated in Electrical and Mechanical Engineering but also our Chemical Engineering Practice Schools, which have many similar features, though differing in details. Such courses are decidedly successful from our educational point of view, (Continued on page 142)

GROWTH CURVE OF INDUSTRIES



"Timing" Your Investments

Correct timing in investing means more than buying stocks when they are low and selling them when they are high. Successful investment timing must consider a third phase: "life-time." This is pictured in the chart above.

Just as business as a whole has its periods of prosperity, stability and decline, so too the individual industry must pass through the stages of childhood, maturity and old age.

Your Vital Question

The important question for an investor to ask is: How old is the industry and in what period of its own industrial life is it? These divisions of an industry's life span are roughly four: (1) development; (2) rapid growth; (3) stability; and (4) new development or decline.

Auto — a Good Example

As an example of what a new industry faces in the development period, consider the automobile. For twenty years, from 1890 to 1910, this industry went through innumerable hardships and growing pains. It lacked popular acceptance, output was low, costs high, and mortalities among all companies heavy.

Boom Period

Then in 1910 the industry began to emerge from its formative period into a new cycle in which mass production supplanted hand methods. Then followed a period of great expansion beginning in 1916 and continuing until 1929. Today the automobile industry is in the period of stabilization.

Too New?

Television, on the other hand, can be classed as still in the experimental stage. Chemicals, to take another illustration, are on the steepest part of their life line. Coal appears to be on the down-grade while glass has found a new lease on life.

Big Profit Time

From the investment viewpoint your capital should be distributed mainly in those industries which are in the period of middle growth. They are beyond the promotional problems and yet are still not approaching the saturation dangers. It is the ideal stage in the life of an industry.

Check Your List

It is the profit zone for the corporation and its stockholders. It is the correct location for the bulk of your holdings. On the above chart decide where you would place the various industries in which you hold securities. When thus examined your investment portfolio should meet two tests.

Make Two Tests

First: Is your capital diversified over a reasonably broad range? Second: Are you well represented among industries which are in the period of greatest growth? Have you kept the majority of your funds out of raw industries on the one hand, and out of fading industries on the other?

A Three-Fold Plan

On Babson's Supervised List there are about 250 securities distributed over approximately 30 different industries. We recommend the purchase of those which we believe are timed for the period of rapid growth. There are others the sales of which we are advising at the present time.

Automatic Control

Under the Babson plan of Automatic Supervision, clients are not only told when we believe they should sell individual stocks and bonds but also when they should buy into an industry, and when they should get out of an industry.

Safety, Profit, Income

When you time your investment program by this three-fold plan you protect your principal, your profits and your income. The Babson Method gives you the benefit of more than thirty years' experience in the field of investment management.

Under our plan you get complete, continuous, and personalized service

Babson's Reports

DIV. 60-144, BABSON PARK, MASS.

Send me details of your investment service, and current reports on business and investment outlook. Also complimentary copy of chart like the above, showing position of many major industries.

Name

Address

Babson's Reports



Samson Trade Mark

Samson Cordage Works

Boston, Mass.

Herbert G. Pratt, '85, Chairman of the Board

Mills at Shirley, Mass., Anniston, Ala.,
and Icard, N. C.

Manufacturers of braided cords of all kinds, including sash cord, clothes line, trolley cord, signal cord, arc lamp cord, shade cord, Venetian blind cord, awning line, and cord for many other purposes, also cotton twines.

SAMSON SPOT CORD



Trade Mark Reg. U. S. Pat. Off.

Our extra quality, distinguished at a glance by our trade mark, the colored spots. Especially well known as the most durable material for hanging windows, for which use it has been specified by architects for more than forty years.

TECHNOLOGY MEN . . .

Walker Memorial

Technology's Social Center

is the

HOME FOR YOUR
CLASS FUNCTIONS

30

MENUS SUBMITTED ON REQUEST

30

Address: A. W. BRIDGES

WALKER MEMORIAL DINING SERVICE

M. I. T.

Cambridge, Massachusetts

THE INSTITUTE GAZETTE

(Continued from page 140)

and they are reported to be attractive to the coöperating companies. It would therefore seem to be a logical next step to attempt the establishment of similar coöperative arrangements in such fields as industrial chemistry, metallurgy, automotive and aeronautical engineering, and any other industrial fields in which employment is large enough to make possible the detailing of sizable groups of students to work in industrial plants under instructional supervision. I do not advocate for us that type of coöperative education, followed in some institutions, which consists chiefly of alternating periods of a few weeks each of work and study — a plan which is useful in my judgment only when it is the alternative to no education at all or, perhaps, when dealing with students on the trade-school rather than the technological-school level.

Moves in this desirable direction of closer educational coöperation between the Institute and industry have recently been made by our Department of Naval Architecture and Marine Engineering in arranging, with the aid of that Department's Visiting Committee, for a year of experience at sea by students before entering their senior year. The School of Architecture has made some analogous arrangements with near-by city and regional planning agencies and is seeking to provide useful practical experience to its students through summer employment on building jobs.

HONORS COURSES

Our honors courses were first tried out in Electrical Engineering. After evaluation of results, the Faculty then extended to all other Departments the opportunity to establish such courses. Thus far only one other Department, Chemical Engineering, has tried the plan, although Chemistry also has put some of its provisions into effect without adopting the name of honors course.

The chief features of these courses are: (1) careful selection of students admitted; (2) privilege of unusual freedom from supervision, combined with unusual opportunities for consultation with instructors; (3) final comprehensive examinations. In general the plan works well with the best students and not with others; it is more expensive to operate because of the greater individuality of the students' work. Its great assets are its development of initiative and responsibility and its opportunity for progress unrestricted by the slower gait of fellow students.

During the past year the Faculty has begun a reëxamination of the possibility of extending the honors plan

MORNING FACE IN THE BERKSHIRES

A small boarding school for boys and girls from four to fourteen. Prepares for leading secondary schools. Men and women teachers who understand children. Intimate home life.

for information address

MRS. ELEANOR RUNKLE CRANE, Director, Richmond, Mass.

into other Departments, and this study will be continued in the present year. The following facts have emerged from the study thus far:

(1) Many of the features of honors plans, as in operation in other colleges, are already incorporated in our educational program for all students.

(2) We already have wide latitude in avoiding regimentation or the repression of the most brilliant students. For example, one student recently was awarded both a bachelor's and a doctor's degree within less than four years after matriculation as a freshman. Many undergraduates take postgraduate studies. Every undergraduate has at least one experience in independent research, his thesis. Our upper-year classes generally have a ratio of number of students to instructors which compares favorably with the tutorial and similar groups in institutions which have adopted such plans. The large proportion of laboratory courses in our curriculum gives unusual opportunity for personal contact between students and instructors.

Despite what we already have in these lines, many of us believe that we can advantageously go still further. For example, I believe that there is a very sound educational basis for comprehensive examinations in the senior and, perhaps less extensively, in the junior years, and preferably with some oral as well as written parts.

FELLOWSHIP FUND

For selected graduate students who have previously been earning their Graduate School expenses through half-time employment as teaching fellows or assistants, there would be great benefit from an advanced fellowship fund to be available in the last year of their work for the doctor's degree. The large part-time-assistant, part-time-graduate-student group includes many of our ablest and most deserving advanced students. Their teaching or assistant's duties are valuable to them as training and experience, as well as enabling them to pursue

advanced study. But this makes a long, hard road to the doctorate, and sacrifices some of the thrill and the efficiency of full-time devotion to study and research in the last year of graduate work.

It is certain that large benefits would come from a group of special graduate fellowships, with stipends of, say, \$1,000 or \$1,200, awarded annually to the most promising of the part-time teaching fellows or assistants who have come to the stage at which one year of full-time effort should achieve the doctor's degree. The benefits would include better opportunity for, and performance by, these students; relief from part of the social pressures — for example, the long postponement of marriage — so frequently imposed by the necessity of a very prolonged educational program; greater attractiveness to our teaching fellowships and assistantships, which would enable us to draw a still better selection of these useful young colleagues. To put the plan into effect on this scale would require about \$25,000 annually for fellowships. I know of no other way in which additional funds could be devoted more advantageously to the simultaneous objectives of aiding promising young men and aiding the Institute to do a better educational job.

FUNDS FOR RESEARCH

Having devoted strenuous efforts in the past year to bringing into healthy balance the recreational opportunities for our students, even though these efforts only partially attained their objectives, and having our physical plant now in relatively adequate condition, I would suggest that our thoughts for future improvement follow other channels for the time being. In addition to the advanced fellowships just mentioned, and to such funds as may aid in promoting the best possibilities of the coöperative and honors plans of undergraduate study, our greatest opportunity for increasing significantly our contributions to human welfare is undoubtedly dependent upon increased (*Continued on page 144*)

PREPARATORY SCHOOLS FOR BOYS

BERKELEY PREPARATORY SCHOOL

Established 1907

Special preparatory courses for M.I.T.

Day School — Evening School — Summer Session — Co-Educational

Accredited by N.E. College Entrance Certificate Board

HARRY F. CADE, JR., '28, Headmaster

470 Commonwealth Ave., Boston Send for Catalog "T" Tel. COM 9262

CHAUNCY HALL SCHOOL

Founded 1828. The School that confines itself exclusively to the preparation of students for the Massachusetts Institute of Technology.

FRANKLIN T. KURT, Principal, 553 Boylston Street, Boston, Mass.

CRANBROOK SCHOOL

Distinctive endowed preparatory school for boys. Also junior department. Exceptionally beautiful, complete, modern. Unusual opportunities in music, arts, crafts, sciences. Hobbies encouraged. All sports. Single rooms. Strong faculty. Individual attention. Graduates in over 50 colleges. Near Detroit.

REGISTRAR

4300 Lone Pine Road, Bloomfield Hills, Michigan

HEBRON ACADEMY

Thorough college preparation for boys at cost surprisingly low due to endowment and country location. 75 Hebron boys, freshmen in college this year. Experienced faculty. Excellent dormitory, classroom, laboratory and athletic equipment. Write for booklet and circulars.

RALPH L. HUNT, Principal, Box T, Hebron, Maine

HUNTINGTON SCHOOL FOR BOYS

Five Forms. Special two-year course for entrance to M.I.T.

Summer Session (Co-educational)

Send for catalogues

CHARLES H. SAMPSON, Ed.M., Headmaster

320 Huntington Ave., Boston

Tel. Kenmore 1800

NEW HAMPTON SCHOOL

A New Hampshire School for Boys. 118th Year. Emphasis on Thorough Preparation for Technical and Liberal Arts Colleges. School's Location and the General Participation in Sports, Conducive to Health. Six Modern Buildings. Address

FREDERICK SMITH, A.M., Box 191, New Hampton, N. H.



PEQUOT MILLS

SALEM, MASS.

HENRY P. BENSON
President

—Class '86

The Rumford Press
CONCORD, NEW HAMPSHIRE



WHERE PRINTING IS STILL A

Craft

THE INSTITUTE GAZETTE

(Continued from page 143)

funds for research. I have said this same thing on previous occasions. I do not need to defend this viewpoint by answering the criticism that it is ideas and genius primarily, and money only secondarily, which bring values in research. I do not need to argue this, for every one of you has, through Visiting Committee duties, seen part of the vision of what the Institute could accomplish for the benefit of humanity with the ideas and genius already waiting only for the resources to make this vision a reality. We are doing a good deal in such lines now, but we are only scratching the surface of what we might be doing. I probably feel more keenly about this than you do simply because I have had better opportunity to examine the imminent possibilities in this line all through the Institute.

Let me give just one illustration of the many situations with which Dean Bush and I have had to struggle literally every day. Two years ago one of our professors came to us with a very interesting and entirely original suggestion for reducing dangers from floods. He had found that some soils may, from organic materials such as come from decaying vegetation, come into such a colloidal condition as to be almost impervious to water. In such condition, rain water will not soak into the soil but will rapidly run off its surface in the manner to produce floods. But he discovered that exceedingly small amounts of cheap chemicals could change the colloidal condition of this soil so that it would let water soak through it freely, which is exactly what is desired to reduce flood hazard and store water in the ground. Being himself swamped with a rapidly increased teaching program, he asked for assistance to secure a large selection of undisturbed samples of soil from some agricultural watershed, such as the Ohio River, and to perform the necessary laboratory tests on these samples. I think you will agree that this is an interesting and novel suggestion in a very important field of human welfare, and the preliminary tests and calculations had shown that the suggestion was not a wild one. Efforts to secure funds to make these tests have proved unsuccessful.

You may well say to me that surely it should be possible to secure funds for so worthy an enterprise, to which I heartily agree. But the difficulty lies in the fact that this is but one of a hundred opportunities of equal

**MONSANTO CHEMICAL
COMPANY**

Merrimac Division

EVERETT
MASSACHUSETTS

*The largest and oldest
chemical manufacturer in New England*

average importance. The result is that we spend most of our efforts in trying to find ways and means for prosecuting these investigations; we succeed in a minority of cases, and the rest drag on to haunt us with an ever-increasing memory of lost and vanishing opportunities through enforced negligence.

I wish there were time to let you see some of these situations in detail. We are proud and enthusiastic over those cases in which ways and means have been found for carrying on important projects. But I think that you will understand why I have put a great research fund at the forefront of our major needs, if you expect us to take good advantage of our ever new opportunities to advance human welfare.

ENDOWED PROFESSORSHIPS

A letter from one of our group has called attention to a very surprising peculiarity of the Institute: It has not one single endowed professorship. Harvard has 103, Yale 79, Oxford 62, Columbia 58, Cambridge 49, Princeton 36, and Chicago 21, according to a recent compilation by President Hutchins of Chicago. In endowment campaigns of other universities, endowment of professorships has often been found to be the most appealing of all objectives. We have, I think, only two professorships named as memorials, and neither of these is endowed. We had made a start toward endowing a professorship to honor our late great colleague, Elihu Thomson, but this was held in abeyance during the depression, pending more favorable times. Some of you have expressed the thought that a professorship named for the late President Maclaurin and contributed by Alumni who were students during his administration would be the most appropriate memorial to this great builder of the new Institute of Technology.

The least that I can do is to call your attention to this great lack and great opportunity. The least that you can do is to call it to the attention of others. No more permanently useful gift and memorial is possible in the entire field of education than a professorship whose influence will be spread and multiplied.

Gentlemen, I appreciate your interest in this inadequate review of status and needs of Technology. The Institute needs your continued active interest, and I greatly need your help and counsel. The social value of the Institute's objectives justifies all our combined efforts to carry them forward.

**MANHATTAN
RUBBER
PRODUCTS**

for
INDUSTRY

Transmission Belt
Conveyor Belt
Hose for every service
Molded Goods
Rubber Linings and
Coverings
Brake Linings and
Clutch Facings
Abrasive Wheels

Col. Arthur F. Townsend, '84
Thomas H. Boyd, '23
Wilder E. Perkins, '25
Charles P. McHugh, '26
Daniel J. Hanlon, '37

THE MANHATTAN RUBBER MFG. DIVISION
OF RAYBESTOS-MANHATTAN, INC.
EXECUTIVE OFFICES AND FACTORIES, PASSAIC, NEW JERSEY

1903

1939

K-A ELECTRICAL WARP STOP FOR LOOMS

SOLD IN COMPETITION WITH THE
PRODUCTS OF THE BEST ENGINEERING
FOR USE ON THE LATEST LOOMS

RHODE ISLAND WARP STOP EQUIPMENT CO.
Pawtucket, R. I. EDWIN C. SMITH '91, President

William H. Coburn, '11

William F. Dean, '17

William H. Coburn & Co.

INVESTMENT COUNSEL

68 Devonshire St.

Boston, Mass.

Boit, Dalton & Church INSURANCE

89 BROAD STREET
BOSTON, MASS.

85 JOHN STREET
NEW YORK, N. Y.

SPAULDING-MOSS COMPANY

PLANOGRAPH PHOTOSTAT BLUEPRINT

Sets the Standard for New England

 42 Franklin St.
263 Park Sq. Bldg. — 113 Purchase St.

**LIBerty
3000**

Stahleker Steel Corp.

 Second and Binney Sts., Kendall Sq., Cambridge, Mass.
Telephone Trowbridge 1440

 Hot Rolled Bands, Round, Square and Flat Bars,
Channels, Tees, Plain and Diamond Pattern Plates
Structural Angles, Beams, Channels, Tees.

Cold Rolled Bars—Norway Iron—Deformed Bars for Concrete

 LARGE STOCK PROMPT SHIPMENT
WALLACE BLANCHARD, '16, *Treasurer*

MUIR BROS. CO.

201 Devonshire Street, Boston

*Contractors for
Plain and Ornamental Plastering*
**THERE IS NO SUBSTITUTE
FOR GOOD PLASTERING**

GEORGE MUIR 2ND, '28

**SPECIAL
MACHINES**
Manufactured to Order
Under Conditions Assuring
High Standards of Precision
FIDELITY
MACHINE COMPANY
3908-18 Frankford Ave., Philadelphia, Pa.
**BRAIDING, KNITTING,
SPOOLING, WINDING
AND GARMENT PROCESSING
MACHINES**

THE TREND OF AFFAIRS

(Concluded from page 117)

across), dramatic in execution, and meticulously studied as to exhibition technique but it also posed some very interesting questions for the future. These are of more importance to Americans than the mere fact that, due to Munich, the French government has lost interest in such things as museums of science.

Such a project immediately raises some provocative questions. How well were the disciplines organized? Is it desirable to try to purvey science to the public this way? Is it possible? Is the mind which needs to be overwhelmed by a high-voltage display in order to want to visit the disciplines, the kind of mind which can understand what is to follow? Should not there have been much more provision for educational extension through a good lending library and other tried mechanisms?

More immediately traceable to the architect are three important ideas. Nelson is unquestionably a modernist, but the simplest examination of his project will show that he has left behind him the cold-blooded rationalism which has produced what we are familiar with in modern architecture and has attempted to superinduce on that a humanism, the lack of which has bothered many of us. Equally important is his effort to create a fuller flexibility. We live in a fast-moving world in which only the Japanese have succeeded in producing flexibility in any building. Rapid obsolescence indicates that more attention must be paid to this problem. Most stimulating of all perhaps is to see an architectural project which suggests daring but possible engineering.

Here one more point may be raised:

Affairs in Europe have unquestionably resulted, and presumably will continue to result, in sending to our shores more and more of the stimulating minds of the Continent. Europe has long had to conserve materials; it is entirely natural that these men should come to us with a background which uses daring engineering almost from force of economics. But has not the time perhaps come when we can venture some of these things ourselves? We have the technical knowledge, and our engineers — our aeronautical engineers, at any rate — have the imagination. Cannot American architects and American engineers, deriving stimulus from the discoveries of aeronautical engineering, begin to contrive buildings which pioneer instead of follow? We have reached a ridiculous time in world affairs if, in the very moment when every individualist on the globe looks to America for protection of the individual, Americans must still look across the water for every individualistic suggestion in the arts.



Transits and Levels are used on all largest works and by U. S. Govt. for utmost precision. Rental Insts.

New catalog, just issued, sent gratis

BUFF & BUFF CO. Boston 30, Mass.

L. F. Buff '97 — Henry A. Buff '05
A souvenir plumb-bob sent for 3c postage

PROFESSIONAL CARDS

JACKSON & MORELAND

Engineers

Public Utilities — Industrials
 Railroad Electrification
 Design and Supervision — Valuations
 Economic and Operating Reports

BOSTON

NEW YORK

FAY, SPOFFORD & THORNDIKE

ENGINEERS

BOSTON, MASS.

BRIDGES

WATER SUPPLY AND SEWERAGE

PORT AND TERMINAL WORKS

FIRE PREVENTION

INVESTIGATIONS

DESIGNS

SUPERVISION OF CONSTRUCTION

H. K. BARROWS, '95

M. Am. Soc. C. E.

CONSULTING HYDRAULIC ENGINEER

*Hydro-electric developments — Water supplies. Reports, plans,
 supervision. Advice, appraisals.*

6 BEACON STREET

BOSTON, MASS.

STANLEY G. H. FITCH '00

CERTIFIED PUBLIC ACCOUNTANT

of PATTERSON, TREELE & DENNIS

1 Federal Street, Boston, Mass.

Cost Accountants and Auditors — Tax Consultants

NEW YORK

BOSTON

WASHINGTON

REPRESENTATIVES IN OTHER PRINCIPAL CITIES OF THE
 UNITED STATES, CANADA, ENGLAND AND AUSTRALIA

EADIE, FREUND AND CAMPBELL

CONSULTING ENGINEERS

110 WEST FORTIETH STREET

NEW YORK CITY

PLANS AND SPECIFICATIONS — EXAMINATIONS AND REPORTS

Power, Heating, Ventilating, Electric, Plumbing, Sprinkler, Refriger-
 ating, Elevator Installations, etc., in Buildings and Industrial Plants

J. K. CAMPBELL, M. I. T. '11

MAURICE A. REIDY

Consulting Engineer

BRIDGES

BUILDINGS

STRUCTURAL DESIGNS

FOUNDATIONS

CONSTRUCTION CONSULTANT AND ARCHITECTURAL ENGINEER

Estimates and Appraisals

44 SCHOOL STREET

BOSTON, MASS.

GILBERT NELSON REED

Attorney and Counsellor at Law

SUnset 6-7930

527 Fifty-Eighth Street

Brooklyn, N. Y.

EVERETT E. KENT

PATENT LAWYER

Patents, Trade Marks, Copyrights

United States and Foreign

75 Federal Street, Boston

HUBbard 0234

BENNETT H. LEVENSON '22

PATENT LAWYER

Formerly Examiner in United States Patent Office

PATENTS, DESIGNS, TRADEMARKS, COPYRIGHTS
 CHEMICAL MATTERS A SPECIALTY

Washington Loan & Trust Bldg., Suite 1004, Washington, D. C.

GEORGE T. SOUTHGATE '10

Electrical and Thermal Engineer

Consultant in

APPARATUS, PROCESS and PATENT MATTERS

Office and Laboratory

114 East Thirty-second Street

New York, N. Y.

Telephone

LExington 2-8130

AN AID TO INDUSTRY IN LOCATING OUTSTANDING MEN

YOUNGSTERS TODAY: EXECUTIVES TOMORROW

The best asset a company has is a reputation for kicking men upstairs. This policy makes necessary a periodical influx of able youngsters who develop into executives of the next generation.

In 1939, the Institute will graduate some 600 men with various degrees and various types of engineering and scientific training. If you have needs demanding trained men you will be better satisfied by acting to secure them in January, February, and March.

Of the 549 graduates of 1938, only 63 men are now available!

PLACEMENT BUREAU

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

CAMBRIDGE, MASS.

AN AID TO ALUMNI IN FINDING DESIRABLE POSITIONS

TECHNOLOGY MEN IN ACTION

CHECK LIST OF THE ACTIVITIES AND ACHIEVEMENTS OF M.I.T. ALUMNI, OFFICERS, AND STUDENTS

Allen Honored

¶ The election this fall of C. FRANK ALLEN '72 to honorary membership in the American Society of Civil Engineers, in which he is a life member, having first joined the society in 1878, was applauded not alone by professional colleagues of Professor Allen but by hundreds of students who sat under him during the 29 years that he taught. It is hard when one observes Professor Allen's vigorous activity today to realize that he retired from the Institute in 1916. We summarize a few of Mr. Allen's achievements: Honorary Member: Boston Society of Civil Engineers, New England Railroad Club, Massachusetts Highway Association; Senior Past President: Boston Society of Civil Engineers, Massachusetts Highway Association, Society for the Promotion of Engineering Education; Past President, New England Railroad Club; Life Member, in addition to A.S.C.E. mentioned above, American Railway Engineering Association. With all these interests, Mr. Allen did not desert Technology alumni work: He was a member of the first executive committee of the Association; onetime secretary; member of the committee that started this journal; member of the committee to revise the constitution of the Association, to create the Alumni Council, in which body he represents his Class. Incidentally, he is secretary of his Class. As we mentioned in November, Professor Allen was commencement speaker at Roxbury Latin School last June on the 70th anniversary of his graduation from that school.

Society Elections

¶ Although few can duplicate the record of Professor Allen, just set forth, we have discovered an impressive number of recent society affiliations:

¶ In the American Society of Civil Engineers, appointed to division executive committees: GERARD H. MATTHES '95, R. E. BAKENHUS '96, and CHARLES H. PAUL '96.

¶ In the Society of Naval Architects and Marine Engineers, elected to vice-presidencies: WILLIAM S. NEW-

ELL '99, EMORY S. LAND '06, and FRANK M. LEWIS, Staff. The retiring president of this society is a member of our Corporation: JOSEPH W. POWELL.

¶ In the American Mining Congress, Western division, JOHN C. KINNEAR '07 and CARL J. TRAUERMAN '07 reelected for fourth terms to board of governors. Mr. Trauerman is starting his fifth term as president of the Mining Association of Montana.

¶ In the American Institute of Mining and Metallurgical Engineers, CHARLES CAMSELL '09 chosen one of four new directors.

¶ In the American Institute of Electrical Engineers, CHESTER L. DAWES '09 elected vice-president.

¶ In the American Chemical Society, TENNEY L. DAVIS '13 elected chairman of the history of chemistry division; PER K. FROLICH '23, of the petroleum division; GEORGE SCATCHARD Staff, physical and inorganic division. The election of CHARLES A. KRAUS '08 to the presidency of this society was reported in these pages in February.

¶ In the Scientific Apparatus Makers of America, H. B. RICHMOND '14 elected vice-chairman of the board of directors.

¶ In the National Aeronautic Association, the committee to make the award of the Collier Trophy in September was made up in part by EDWARD P. WARNER '17, THEODORE P. WRIGHT '18, S. PAUL JOHNSTON '21, HENRY B. DU PONT '23, and JAMES H. DOOLITTLE '24.

¶ In the American Society for Testing Materials, LAUREN B. HITCHCOCK '20 elected member of the advisory committee on soap and detergents. Dr. Hitchcock has also been appointed chairman of the alkali and chlorine committee of the Electrochemical Society.

¶ In the American Academy of Physical Medicine, ROBERT S. HARRIS '28, elected to membership, the first non-medical member.

Written

¶ By ALLYNE L. MERRILL '85, WALTER H. JAMES '96, and P. Schwamb, "Elements of Mechanism," fifth edition, Wiley, New York City.

¶ By MARY L. HOLMAN '92, "The Ancestry of Charles Stinson Pillsbury and John Sargent Pillsbury," Rumford Press, Concord, N.H.

¶ By RALPH H. SWEETSER '92, "Blast Furnace Practice," McGraw-Hill, New York City.

¶ By SAMUEL C. LIND '02 and George Glocker, "The Electrochemistry of Gases and Other Dielectrics," Wiley, New York City.

¶ By DENISON K. BULLENS '09, "Steel and Its Heat Treatment," fourth edition revised, two volumes, Wiley, New York City.

¶ By JOHN L. BRAY '12 and J. T. Fotos, "German Grammar for Chemists and Other Science Students," Wiley, New York City.

¶ By ALFRED S. NILES '17 and JOSEPH S. NEWELL '19, "Airplane Structures," second edition, two volumes, Wiley, New York City.

¶ By EDWARD R. SCHWARZ '23 and LEONARD SHAPIRO '34, an article, "Cotton Fiber Maturity; Polarized Light and Cross-Section Studies," *Rayon Textile Monthly*, June, July, August, and September.

¶ By HENRY B. KANE '24, "Alphabet of Birds, Bugs and Beasts," illustrated by the author, Houghton, Boston.

DEATHS

**Mentioned in class notes.*

¶ EDGAR W. UPTON '72, October.

¶ MARK A. LAWTON '83, October 21.

¶ WILLIAM ROOT '96, November 9.

¶ HARRY MORSE '99, November 27.

¶ JOHN L. TUFTS '99, October 24.*

¶ CHARLES H. HARRIS '01, October 22.*

¶ FRED S. PHELPS '06, October 17.

¶ JULIAN M. WRIGHT '06, October 6.

¶ CHARLES C. KINSMAN '08, November 16.

¶ RICHARD J. FAVORITE '14, November 30.

¶ LOUIS W. STEVENS '16, October 26.*

¶ WAYNE F. MCMEANS '23, May 13.

¶ FRANCIS G. MARDEN '24, October 18.

¶ ABRAHAM H. SIMONDS '25, September 3.

¶ WALTER W. HOPPE '28, November 8.*

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

Technology Breakfast at Kansas City

The annual conventions of the American Public Health Association are always attended by a considerable number of Technology men engaged in the various professional activities comprised in the broad domain of public health. In this group are to be found representatives of all branches of the service, from state health commissioners to young laboratory assistants. The list is a comprehensive one, including Federal and state public health engineers, directors of foundations, consulting sanitary engineers, industrial hygienists, epidemiologists, statisticians, food technologists, and nutrition experts, bacteriologists, teachers, and workers in prevention of tuberculosis, cancer, and other diseases. To these are to be added the manufacturers of materials and equipment needed for all aspects of public health engineering and sanitary control of environment.

The A.P.H.A. meetings provide a clearinghouse for new information, a great center for dissemination of facts and reports on research, and, perhaps most enjoyable and effective of all, a place for exchange of ideas and experiences through personal and social contacts. In all these yearly meetings Technology men have always taken a worthy place on the programs of the numerous sections.

One can be reasonably sure that the attendance will include three score or more persons who have had at least a part of their public health training at M.I.T. The Kansas City meeting, held from October 24 to 29, was no exception. About 10 or 15 years ago a plan was developed to bring the Technology group together at an eight o'clock breakfast, and an announcement of it was inserted in the printed program. As public health instruction at the Institute centers especially in the Department of Biology and Public Health, the plan was sponsored especially by its staff members and a few graduates, and the Head of the Department or one of the professors was nominal host for the occasion. The plan was found to be acceptable, and a small group — all students of the admired and lamented Professor Sedgwick — gathered to break bread together and were then given a brief account of what is going on at the Institute. This unique form of Technology gathering has been kept up through the years and is annually attended by a large portion of the Technology persons at the convention. Others, forced to be absent by committee meetings or by other duties, always express regret. The plan is no longer unique, however, for the idea has been taken up by the representatives of

the other schools of public health, and at Kansas City breakfast meetings were also held by groups from Johns Hopkins, Harvard, Yale, and the University of Michigan.

At the Technology breakfast this year were approximately 50 men and women. An especially enjoyable feature was the presence of six representative Alumni from the Kansas City Technology Club, who were most gracious and helpful to the strangers gathered from all quarters of the land.

Following the breakfast Dean Prescott '94 gave a brief account of the developments at the Institute, the new buildings, research activities, changes in Departments and Faculty, and the plans for the new track and field house. It was a pleasant occasion.

M.I.T. Club of Akron

Our first meeting for the year 1938-1939 was held at the University Club on October 10, where we were addressed on the "Needs of Our Community" by Dr. R. J. Humbert, the pastor of the Firestone Methodist Church. Dr. Humbert is an experienced social worker in addition to carrying on his professional work. He told us that this meeting was like a homecoming, for he had spent many happy hours at the home of our president while he was studying at Harvard and Boston University. After the address elections were held, resulting in the choice of George Sackett '18 for president and John T. Cox, Jr., '36, for secretary-treasurer.

We believe that no official mention has been made of a phenomenon that exists here in Akron, one of which we are extremely proud. 'Tis called the M.I.T. Wives' Club, and its membership is composed of our spouses. As far as activity is concerned, we have to concede them the palm by a large measure; indeed, they entertain us much more frequently than we do them. In fact, we haven't entertained them at all, and this has been the subject of much pointed conversation and many hints. In time the pressure may become too great to bear, and we shall have to do something about it.

The Wives' Club meets every month. The club has officers, a constitution, and dues. The meetings are devoted to bridge, animated conversation, and charity work for the visiting nurses association in Akron. This club was organized in 1935 and in the three years since has developed an active membership of 35 and assumed a definite place in the Akron social scene, appealing both to wives of 25 years' endurance and to the newest of brides. This November the women entertained us at a musicale in the home of Dr. and Mrs. Ray Dinsmore '14 — first with a dinner and then with a program of music by some very excellent local talent. After the eve-

ning was all over, we were more depressed than ever: How can we entertain the ladies with anything so fine? Now if they played poker and drank beer! So, we present to you our Wives' Club. We think it to be the first club of its kind in the land and certainly the finest. We salute our ladies, God bless 'em. — JOHN T. COX, JR., '36, *Secretary*, 76 Corson Avenue, Akron, Ohio.

Technology Club of Bridgeport

The Club held its first meeting on October 27, at which time Frederick K. Morris addressed us in a most instructive and informative manner, giving a more or less scientific, unbiased opinion on how the present struggle between China and Japan has evolved over a period of years. Thirty of the active Alumni in the Bridgeport area attended this gathering and all enjoyed meeting Professor Morris and hearing his discussion.

The next meeting of the Club is scheduled for the latter part of this month, at which time we hope to have a greater turnout than the first meeting of the year. We will have as our guests the men from the Bridgeport area who are now attending Tech. Announcements will be sent out early this month so that all Alumni in the area will have ample time to reserve the night for the club meeting. — EARL MEGATHLIN '35, *Secretary*, 10 William Street, Ansonia, Conn.

Indiana Association of the M.I.T.

The Association held its first meeting of the season on Monday, October 24, at 8:00 p.m. at the residence of President Hauelsen '23. Some 15 of the local fellows were present. It was discovered that two out-of-town Alumni from the East were in Indianapolis, both planning to be present. However, only one, Richard Ranger '11 arrived, under guidance of Wylie Daniels '13.

During the early part of the evening, the two reels of Edgerton high-speed camera films were shown and much enjoyed. These were followed by a brief, informal get-together. The evening was brought to a climax with a delicious buffet supper of ham, salad, and all the "fixin's," tendered to us by our genial host. Toward the last hour of the evening the group dispersed after a hearty vote of thanks to our host and our behind-the-scenes hostess. — RICHARD L. BERRY '30, *Secretary*, 2353 North Delaware Street, Indianapolis, Ind.

Technology Club of New Hampshire

The annual meeting of the Club was held at the Carpenter Hotel, Manchester, N. H., on Thursday, October 13, with a

total attendance of 24. Dinner was served at 6:30 P.M. with President Africa '15 as toastmaster. The speakers were secured and piloted by Charles E. Locke '96, Alumni Secretary, and included H. B. Richmond '14, President of the Alumni Association; Robert E. Rogers, Professor of English at the Institute; and Ralph T. Jope '28, Business Manager of The Review.

After the speaking a short business meeting was held, at which the following officers were elected: President, Herbert D. Swift '15; Vice-President for Manchester, Walter D. Davol '06; Vice-President for Concord, Harold E. Langley '19; Vice-President for Nashua, Robert C. Erb '17; Secretary-Treasurer, Malcolm C. Mackenzie '14, who was elected also as representative to the Alumni Council. In addition to the guests, the following members were present: Abbott '06, Africa '15, Bean '94, Clough '91, Conner '88, Davol '06, Emerson '27, Erb '17, Hall '08, Hall '14, Heimer '08, Hunt '95, Jackson '95, Langley '19, Mackenzie '14, Mrs. Norton '13, Rich '26, Roberts '04, Swift '15, and Waymouth '16. — MALCOLM C. MACKENZIE '14, Secretary, The Benjamin Chase Company, Derry Village, N. H.

Technology Club of South Florida

On November 22 the members of the Club and their guests met at the University Club, Miami, for dinner. It was a pleasure to welcome at this meeting Horatio Bond '23, our club representative on the Alumni Council at Cambridge. Mr. Bond was on his way home from Havana, Cuba, where he had read a paper before the Pan American Congress of Municipalities. At the close of the club business, so ably conducted by President Brown '30 and Secretary Thayer '23, John F. Austin '38 introduced the guest speaker, A. I. Margolis of Miami. Mr. Margolis, President of Technocracy, Inc., spoke on technocracy. Seldom has the Club heard such a splendid speaker or one so thoroughly cognizant of the subject. If his prediction of things to come was disturbing, his solution that the engineers would take over was satisfactory to all.

May we take this opportunity of urging any M.I.T. member who contemplates visiting Miami this winter to make his presence known. Our members will see to it that his visit is a pleasant one. — CLARENCE P. THAYER '23, Secretary, 1760 Northwest 41st Street, Miami, Fla.

M.I.T. Club of the Virginia Peninsula

We began organizing this Club about a year ago when we discovered that the section was literally alive with Tech men, mostly in the Newport News shipyard and at Langley Field and Fort Monroe. Our latest records show about 75 or 80 men in this comparatively small section. Now, after three formal meetings, we consider ourselves out of the embryo stage and fully matured to the point where the

Club has become an established part of our social life. It has been our desire to furnish at these dinner meetings speakers who can help to broaden our cultural and social life, which, unfortunately, is confined pretty narrowly to either shipbuilding or aeronautics. For instance, at our last meeting, November 16, our guest speaker was Major Leslie W. Jefferson of Fort Monroe, who recently took part in maneuvers at Fort Bragg, N. C., where the antiaircraft defenses of the country were tested against warplanes from Langley Field. Well, the service men and civilians don't get together much around here, and to give you an idea of the interest shown in Major Jefferson's talk, I need only say that over two hours were spent in delivering it and answering the questions that followed.

The officers of our Club are: President, John Stack '28; Vice-President, Louis B. Peterson '27; Secretary, John R. Graham '36; Treasurer, Edward B. Rowe, Jr., '36. — W. Creighton Clay '28 reports that he has sold an invention in the aeronautics field which should put him on easy street. Starr Truscott '07 has recently returned from Germany, where he was the guest of the German government at an aviation conference. — Frederic E. Glantzberg '27 has had many interesting flights with the new Flying Fortress bombers of the United States Army, one of them being the important good-will flight to Argentina last summer. Captain Glantzberg is now vacationing in Mexico City. — JOHN R. GRAHAM '36, Secretary, 216 Manteo Avenue, Hampton, Va.

M.I.T. Club of Northern New Jersey

At about midnight on November 18 from the Newark Athletic Club there departed 321 fully satiated M.I.T. Alumni and their guests. They had eaten well of an 11 o'clock buffet supper, and earlier in the evening had sat spellbound while Dr. J. O. Perrine described and illustrated some of the outstanding problems which have faced the communications engineer and the remarkable progress which had been made during the last decades in the solution of these problems. Dr. Perrine, who is associate editor of the Bell System *Technical Journal*, had presented to the Club his famous demonstration lecture: "Waves, Words and Wires." A good-sized fortune was spent to develop the special equipment and to prepare it for Dr. Perrine's lecture.

Dr. Perrine used a loud-speaker which has three separate throats — one handling low frequencies, one intermediate frequencies, and the third handling the high frequencies. These three throats can be used individually or as a single unit, and their total range is from 50 cycles to 9,000 cycles per second. Dr. Perrine demonstrated the range of frequencies which must be transmitted in order to reproduce faithfully different classes of sound, such as vowels, consonants, and music. The capacity of the present-day communication line to transmit a wide range of frequencies and give faithful reproduction

was demonstrated by means of the loud-speaker and special circuits to Chicago and to Cleveland. Dr. Perrine compared a reproduction of the first telephone message between New York and San Francisco in 1915 with the same conversation after it had been transmitted to Cleveland and back over the present-day telephone cable; and then with vocal and instrumental music after the music had been carried to Chicago and back over the special wires used for the transmission of radio broadcast programs. Dr. Perrine pointed out that the amount of acoustic energy liberated by a full-sized orchestra is only a few watts, but the variation in energy level is many thousandfold. The conversation circuit to Cleveland handled energy variations of 1,000 to one, and the broadcast circuit to Chicago, variations of 10,000 to one.

Dr. Perrine then illustrated the necessity of having all of the vibrations reach the loud-speaker or listener at the same instant. To show how distance and type of circuit affect the rate of travel of the impulse, he snapped his fingers into the microphone and two distinct snaps came out of the loud-speaker. The second, or echoing, snap had traveled over the Chicago circuit and back to Newark. Then, when the snap was allowed to travel simultaneously over the wires to Chicago and to Cleveland as well as direct to the loud-speaker on the platform, three distinct snaps were heard for each one of Dr. Perrine's. Finally, he demonstrated how the snaps could be made to chase each other around the circuits with the result that a single snap of Dr. Perrine's fingers became a diminuendo of half a dozen or more echoing snaps from the loud-speaker.

Certainly no one in the audience could fail to marvel at the fidelity with which the communications engineer and physicist have made sound travel over limitless distances, and to realize, for the first time perhaps, how effectively space and time have been eliminated and how far on the road to perfection has come the art of communication — defined by Dr. Perrine as "getting words from one man's mouth into the ears of someone else far away."

The Perrine lecture displays clarity and polish at their best and is an entrancing outline of the major aspects of communication by wire. Your reporter can do no more than to admonish you who missed it this time to hear the lecture without fail if ever you can. The audience gave a spontaneous rising vote of thanks to Dr. Perrine, to the Bell System which made the lecture possible, and to those who assisted on the platform and in the Newark, New York, Cleveland, and Chicago exchanges. Before the lecture President Clarke '21 gave a brief résumé of club plans and activities, and Al Phillips '00 gave a report on the activities of the admission and scholarship committee. (See the next issue of The Review for details.)

The next smoker, to be held early in February, will be devoted to fun, fellowship, and conviviality, with no serious speeches, and with a stein on the table. Watch for the advance notice! — CLAY

TON D. GROVER '22, *Secretary*, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. FREEMAN B. HUDSON '34, *Assistant Secretary*, Colgate-Palmolive-Peet Company, 105 Hudson Street, Jersey City, N.J.

M.I.T. Club of Western Maine

The annual meeting of the Club was held on Saturday evening, November 19. Due to a very rainy evening and the unfortunate conflict with a meeting of the Maine Association of Engineers, a thing which had to happen despite the best efforts of the Secretary, a rather small group was in attendance. We were the guests of S. Lindsay Lord '28, dean of the Portland Junior Technical College. This is a new institution and is quite flourishing for a youngster. Starting out in half of a large store in the suburbs two years ago, it now occupies the whole of a large building on Plum Street near the center of the city. There was ample opportunity to inspect the whole building, from the photographic laboratories and rest rooms in the basement to the combination drawing room and assembly hall on the third floor. We were interested in the mechanical laboratory on the ground floor and the fine classroom and chemical lab on the second, but space does not permit a full description at this time.

At the appointed hour, we sat down to tables set up in the mechanical lab and were served dinner by a couple of young ladies who mysteriously appeared from somewhere laden with appetizing dishes. One of the guests was Mr. Frost of the Portland Company, who represented William N. Todd '04. Bill unfortunately has been stricken with heart trouble and has been confined to his bed since September. He has always been one of our most enthusiastic members and never missed a meeting. We were glad to have Mr. Frost with us.

Following the dinner, a short business meeting was held, at which Dean Lord was elected to the presidency to take the place of Stanley W. Hyde '17, resigned. The present Secretary was reelected. Next on the program was our old friend Charles E. Locke '96, who reported to us on the state of the Institute. He was followed by George Owen '94 of the Department of Naval Architecture at Tech. Professor Owen had brought his moving picture camera and showed us some highly enjoyable ocean scenes, as well as scenes of the dinghy racing in the Basin, a relatively new sport that has apparently proven very popular with the student body. Upon seeing the reels, we old-timers have no cause to wonder why. Another innovation at Tech which made a good impression is the Freshman Camp as depicted in the colored reel which Professor Locke so kindly brought. The always acceptable Edgerton high-speed films completed the evening's entertainment.

At the close, Dean Lord called attention to an exhibition of some colored photography which was taking place in the laboratory downstairs, so that it was

a late hour before the enjoyable evening finally came to a close. — ALFRED E. B. HALL '15, *Secretary*, 19 Locke Street, Saco, Maine.

M.I.T. Club of Central New York

On September 10 the golfers and dubs of the Club teed off against the experts from the Rochester aggregation for an 18-hole contest at the Geneva Country Club, on the shores of beautiful Cayuga Lake. The players and gallery coaches spent an enjoyable afternoon, after which the party adjourned to Bellehurst. Famed for pleasing the palate, Bellehurst's chef brought forth a dinner of epicurean delights, which was enriched by songs and yarns of Tech and Walker, recalling many almost forgotten days. Before the close of an all-too-short evening, it was unanimously decided that more joint meetings should be held between Rochester and Syracuse.

Among the officers of the Club present were: Harold P. Gray '16, President; Edwin A. Gruppe '22, Vice-President; Francis D. McKeon '26, Secretary; Frederick W. Barker, Jr., '12, Honorary Secretary; William H. Eager '04, Chairman of Activities Committee. — FRANCIS D. McKEON '26, *Secretary*, 210 Wellesley Road, Syracuse, N.Y.

Washington Society of the M.I.T.

The November meeting of the Society was held in the Mirror Room of the Lafayette Hotel at 5:00 p.m. on Friday, November 18. Edwin W. James '07 announced that the executive committee had arranged a buffet supper as an experiment to see whether this type of dinner at a slightly lower cost might prove popular. Apparently it did, since we had an unusually large attendance. President James remarked that he was glad to see our "Secretary Emeritus" back with us. Proctor Dougherty '97 promptly corrected him for using the new title and advised that he was officially the Honorary Secretary and that the last meeting, which he failed to attend, was the first in five years which he had missed; this was due to the fact that he was out of town on business. He was promptly complimented from the floor for his excellent record.

Mr. Dougherty noted an item in the November Review regarding the late Dr. Tyler's ('84) sense of humor. This item by Howard M. Edmunds '05 describes the help given him by our late President at the time Edmunds was taking entrance exams, and mentioned Dr. Tyler's wit in declining an invitation because of a previous engagement when he finished with the phrase, "regretting my indivisibility." We in the Society can well appreciate this because on many occasions we had the benefit of Dr. Tyler's wonderful sense of humor as he directed our meetings. Mr. Dougherty also commented upon a recent press notice that Edward L. Moreland '07, recently appointed Dean of Engineering, was testifying in

the T.V.A. hearing. A humorous incident occurred in connection with Mr. Dougherty's telephone call, made to remind him to come to our meeting. The telephone clerk sent a call for Mr. Moreland to the senator conducting the hearing, and the latter promptly adjourned it, asking that Dean Moreland contact Mr. Dougherty at once.

After these opening remarks, Mr. Dougherty introduced some newcomers and some who have not attended recently, including Theodore L. Soo-Hoo '26, Oliver G. Green '30, Merritt P. Smith '19, Amerst E. Huson '30, G. Donald Fife '24, John Lowe, 3d, '37, and our Treasurer, Charles H. Godbold '98. Godbold remarked that if he had known our Secretary "Emeritus" was not at our last meeting, he would have been worried, because he had been called upon to produce funds to cover any costs during his own absence and had forwarded a blank check properly endorsed to the Honorary Secretary. The latter replied that he had been making an investment for M.I.T. in Cleveland, where he had called upon the local Honorary Secretary. However, he was returning the check unused and undiscounted, in the presence of witnesses. James Swan '91 apparently felt that some credit was due him for getting the check returned intact, because he stopped Dougherty on the street in Cleveland, and the latter took some pains to explain that his trip was entirely legitimate.

At this point the meeting was turned back to President James, who voiced our good fortune in obtaining Charles G. Abbot '94, Secretary of the Smithsonian Institution, as the speaker and announced that Dr. Abbot would explain some of the mysteries of the sun and how he had been fortunate in putting it to work. Here, your Review Secretary wishes to apologize for any technical errors that may have occurred in the transcription of these notes. After some 16 years away from the Institute, he was hard put to transcribe the proceedings, and if any incorrect technical explanations are claimed, he will lay the blame on Dr. Abbot. Dr. Abbot started with his experiences 20 years ago at about the time that the House revolted against Speaker Joe Cannon. After the change in election, ranking Republican members of the Appropriations Committee made Representative Fitzgerald the new chairman. Mr. Shirley was sitting next to him in a hearing at the time that Dr. Abbot was asked to explain the work of the Astrophysical Observatory. Shirley thought that Fitz might have to explain this at some time to his colleagues. Uncle Joe thought this was unnecessary. He remarked on the time when \$4,000 was asked to enable Dr. Abbot to investigate infrared rays with a bolometer and someone said: "Couldn't we abolish that?" Uncle Joe replied: "No, everything hangs on the sun, and I think it ought to be investigated, and I think this appropriation is O.K."

With this as a start, Dr. Abbot explained that the temperature of the earth does depend on the sun; even the evapora-

tion of the ocean, which furnishes hydroelectric power and the means for plant growth, also depends upon it, as does the ozone, which stops some of the ultraviolet rays and allows enough to penetrate the atmosphere. With too much ultraviolet we could not live, but with too little we would all have the rickets. Dr. Abbot has recently been convinced that the weather depends upon small variations in the intensity of the sun. The sun is a variable star, with a small range of variation of from one per cent to five per cent, and produces the principal cause of changes called weather. With an appropriation of \$300,000 he could furnish weather bureaus all over the world with predictions of weather two weeks in advance. A friend had recommended to the late Senator Robinson an increase of \$200,000 in appropriations so that the Smithsonian's three solar stations could be expanded to seven more in order to observe the sun every day to get values to as close as one-fifth of one per cent, but the amendment to the deficiency bill, after passing the Senate, was rejected in the House, although it amounted to only one twelve-thousandth part of a bill appropriating \$2,400,000,000. As a result, the Smithsonian never got the money, and Dr. Abbot commented that he may die before he sees it done, but if \$300,000 would furnish all of the weather bureaus of the entire world with information two weeks in advance, the money would be very well spent.

Another feature of the sun is that it supports the growth of all plants. The green leaves can break down the carbon dioxide in the air only under the influence of light, and although this gas is present only to three-hundredths of one per cent of the atmosphere, all of the carbon by which all the coal and wood, and so on, was produced came out of the air during the course of the world's history. It is the most important chemical reaction in the world. Dr. Abbot has made studies producing a curve which indicates to two per cent or better that the reaction begins with certain rays beyond the blue or violet and does something else at some other stages in the spectrum which we could not successfully report. Other studies have been made regarding plants turning toward the light, and the finding has been that this is caused by hormones — like vitamins in foods — that are found in the buds at the top of the plant. Among the results of the studies of the Smithsonian, a spectroscopic means has been devised to determine the carbon dioxide in the air in minute quantities. The water and carbon dioxide are exhausted from a rock-salt spectroscope. A chamber containing a growing plant has its atmosphere circulated in a path of light, making it possible to observe the slightest change in the intensity of the light beam, enabling an instantaneous determination of the quantity of carbon dioxide. Although there is only three-hundredths of one per cent in the air, the quantity can be observed down to one three-hundredth of the above figure with this instrument.

Some work has been done on the time relationship of the growth of plants. Garner, in Agriculture, found that if light was intermittent, it affected growth. A rather long period of intermittence allows the plant to grow well, but when this becomes more rapid, the plant is less robust. Beyond this intermediate stage, in more rapid cycles, growth becomes even more efficient. Studies have been made at the Smithsonian of the resting time of plants, getting quantitative results which have brought letters from all over the world. For many years Dr. Abbot has been interested in the heat from the sun and for many years has used it for cooking on Mount Wilson. A device about 12 feet by eight feet concentrates the sun's rays on a tube which is held parallel to the axis of the earth by means of clockwork, moving the mirror about 15 degrees per hour, keeping the rays focused. Gravity oil circulation and heavy insulation make it possible to bake all kinds of food, such as bread, meat, pies, and cakes, and Dr. Abbot's wife has used this for the last 15 years during his studies at the observatory. Innovations on a small model include a vacuum tube to retain heat and a cheap clock mechanism for rotation, making possible volume production of a small model for about \$30, which model will get hot enough to bake in an hour and then bake continuously.

Other developments include a distilling plant, using a two by six mirror. This distills two and a half gallons of water per day for drinking purposes when Dr. Abbot is in Florida, and he visualizes real use for it in places like Bermuda, where water is carried all the way from New York. Power uses are more readily applied since the development of aluminum, making cheap permanent mirrors possible. With high vacuums produced commercially, Dr. Abbot states that it is possible to make power from the sun for as low as a half cent per horsepower unit, with only first cost to consider. A power device was exhibited a few years ago before the Power Congress in Washington, but the present device is a 12-foot square mirror and flash boiler which will build up 150 pounds per square inch within five minutes. Dr. Abbot urged upon our members some thought concerning the commercial application of these sun utilizers.

Following Dr. Abbot's talk, President James introduced our Secretary, Henry D. Randall, Jr., '31, who discussed x-ray application and equipment, listing among commercial developments the use of x-rays for classifying oranges for juice and for inspecting locations of metal washers around nail holes in rubber heels, and mentioning developments in research on atomic structures. In medicine, he described the ways in which x-rays are used in diagnosis and treatment to enable the doctor to see inside of us and to take permanent pictures. Shadow pictures are possible due to the difference in resistance of various materials to penetration of x-rays, penetration being less as atomic weight increases, enabling x-rays to go

through aluminum more easily, for example, than through glass, with the result that lead glass is used for protection.

Mr. Randall described uses in studies of broken bones and discovery of foreign bodies, such as bullets, where the patient can diagnose the trouble only as a pain. Among the materials used to cast heavier, differential shadows, he mentioned barium sulphate and dyes such as tetro-iodol for injection in veins, making possible pictures of the gall bladder, the kidneys, and so on, depending upon the type of material used. Zinc sulphide and other fluorescent salts allow the taking of actual motion pictures, enabling the doctor to see the heart, for example, in action. Mr. Randall described the x-ray effect as attacking the fastest growing cells most destructively, thus concentrating the action to fast-growing organisms as in cancer without particular injury to other cells. Among the newer equipment in use he mentioned the 400,000-volt, six milliamperage apparatus at Duke University, employing a hot cathode to target system, and the Huntington Memorial job developed by Dr. Trump '33, an electrostatic machine of 1,000,000 volts, with a current below a milliamperage. Such machines give even greater penetration than some of the emanations from radium and make possible a practically unlimited supply of curative rays.

Following this talk, Dr. Abbot commented on the making of radioactive substances by breaking up atoms within the patient, a method which is looked upon by the medical profession with great anticipation for treatment of such organs as the gall bladder. Mr. Dougherty inquired concerning the new solar observatory in New Mexico, and Dr. Abbot replied that, due to the possibility of war, expensive transportation by auto and camel, and the danger to observers from intestinal troubles, the Smithsonian had abandoned its Cairo project and has located its new station in New Mexico, where climatic conditions are much the same as in old Mexico, with the expectation that the new station will give much the same meteorological characteristics as would one in old Mexico.

Following the talks, the Society enjoyed an excellent buffet supper, served by the Lafayette Hotel. — HENRY D. RANDALL, JR., '31, *Secretary*, 119 South Chel-sea Lane, Bethesda, Md. WILLIAM K. MACMAHON '22, *Review Secretary*, 818 25th Street, South, Arlington, Va.

M.I.T. Women's Association

On Thursday, November 3, the Association held its first meeting of the year in the Emma Rogers Room at the Institute. The occasion was the annual supper given by the Alumnae to the present women students. Miss Ella Munsterberg, teacher, artist, and lecturer, gave a very interesting talk on "The Charm of Cairo." It was her privilege to spend the best part of a year there, during which time she had ample opportunity to observe the people and their problems. Of special interest was her fascinating description of

different types of Cairo women and the trips she took into the surrounding country, illustrated by her own delightful water colors.

Miss Munsterberg, who teaches at the Massachusetts School of Art, went to Cairo to study the perfection of Egyptian art as demonstrated by the collection of some 2,100 pieces taken from the tomb of Tutankhamen. The hostesses for the evening were Mrs. A. H. Vignoles '22 and Elizabeth M. Dolan '34. — MARY K. CUSICK '31, *Secretary*, 84 Alberta Road, Brookline, Mass.

CLASS NOTES

1883

One of the most notable members of our Class was Christopher La Farge, who with George L. Heins (record high jumper of athletics in our time) carried on an internationally known firm of architects in New York City. La Farge was a leading architect for the Cathedral of St. John the Divine and for other notable buildings.

La Farge died in early October at his home in Saunderstown, R.I. His age was 76 years. He was married in 1895 to Florence Lockwood, a niece of Senator Bayard of Delaware; there are four children by this marriage. From the *London Times*: "Born at Newport, Rhode Island, on January 5, 1862, he studied at the Massachusetts Institute of Technology in 1880 and 1881, and in the office of Mr. H. H. Richardson in 1882. In 1883 he joined his classmate, Mr. George L. Heins, at Minneapolis, and with the latter took charge of the architectural work of his father. From 1886 to 1910 he was a member of the firm of Heins and La Farge, and from 1910 to 1915 of the firm of La Farge and Morris. The general public will remember La Farge best perhaps as a designer of New York's subway stations and of the buildings in the New York Zoological Park. His other buildings included the United States Naval Hospital at Brooklyn, the New York Yacht Club station, St. Matthew's, Washington, the Roman Catholic Cathedral, Seattle, many memorials, and numerous private residences. He was a fellow and director of the American Institute of Architects, a past president of the Architectural League of New York, and chairman of the advisory committee at the School of Architecture, Columbia University." — HARVEY S. CHASE, *Secretary*, 377 Comstock Avenue, Winter Park, Fla.

1885

James H. Simpson Bates writes to the Class Secretary under date of November 16: "On Monday, November 14 last, the Seattle section of the American Institute of Electrical Engineers discussed 'Electricity in Transportation.' The speaker was C. M. Davis, engineer, transportation department, General Electric Company, Erie, Pa. This was an important meeting for me, for I was one of the original staff of the late Frank Julien Sprague,

one of the earliest inventors and promoters in that line. His inventions are extensively used in electric traction. The success of the earliest trolley line, popularly so called, now the Clay Street line in Richmond, Va., up and down its difficult hills made the trolley line a national institution. The successful application of electricity to streetcars was followed by the same on elevated roads, subways, and sections of railroad trunk lines — the leading case being several hundred miles of the Chicago, Milwaukee, and St. Paul Railway's main line." — ARTHUR K. HUNT, *Secretary*, 145 Longwood Avenue, Brookline, Mass.

1887

It is with deepest sorrow that your Secretary announces the decease of our old and valued companion and classmate, George Otis Draper, on October 21 at the home of his namesake son in San Pedro, Calif. From undergraduate days until July of last year, when he wrote the Secretary from the Seaside Memorial Hospital at Long Beach, Calif., that "he was slowly passing out" and would like to be relieved of the trusteeship, George has been the faithful custodian of the class exchequer, a job which required the finesse of the financier, as well as the efficiency of the mathematician, in those days of doubt as to whether the coefficient of the cash balance was plus or minus. Great indeed is the debt of gratitude for his loyal service to his Class during all these long years and deep the sorrow at the thought that his genial presence and ready wit will no longer enliven the gatherings of his classmates.

A pathetic suggestion of his approaching end was contained in a letter written by him to the Secretary on July 21 from the Seaside Memorial Hospital as follows: "Am booked here for three weeks anyway, and then it may be . . . a lovely nook in a mausoleum. I suppose other people have worn out before, and I never did much to conserve energies. The Class of '87 has meant a lot to me, and I am sorry to think that I shall miss the next reunion." A sketch of his life and colorful career as taken from the *Boston Herald*, October 22, is given herewith: ". . . A man of many interests, he won wide recognition in several fields — as an inventor, industrialist, capitalist and author. Along with those distinctions he was widely known in social circles of the East as a clubman and world traveler. His 40-year career before his retirement in 1927 was one of continued rise which saw the Draper Corporation, under his secretaryship, grow to be one of the world's largest manufacturers of cotton machinery. At the same time, he became widely known as an authority on such machinery and, in 1910, was credited with having written more text books and pamphlets on the cotton industry than any other living man.

"A member of one of New England's oldest and best known families, he was born at Hopedale on July 14, 1867, son of William Franklin and Lydia Joy Draper. He attended the Allen School in West

Newton and Milford High School before entering Massachusetts Institute of Technology, where he was graduated in 1887. Shortly after graduation he entered the employ of the Hopedale Machine Company to learn the machinist's trade, but two years later became a member of the firm of George Draper and Sons, which later was merged with the present Draper Corporation. In 1896, he became secretary of that organization, serving 12 years before resigning to go to New York, where he developed many enterprises in several fields of industry. It was then that he entered upon probably the most active part of his career.

"At one time, shortly after the turn of the century, he held the presidency of the following New York organizations: Draper-Hansen Company, advertising and sales promotion; Draper Realty Company, controlling large real estate holdings in the borough of Queens; Imperial Lumber Company, with timber concessions in Dutch Guiana and mills in Brooklyn; Phillips Manufacturing Company, electrical contractors; Hilton Manufacturing Company, dealing in automobile specialties; Farrington Company, handling varnishes and shellacs; American Sand Blast and Waterproofing Company. At the same time he was a director in the following concerns: King-Lawson Company, manufacturers of railroad dump cars; Walpole Rubber Company of Walpole, Mass.; Kinney Manufacturing Company of Boston, manufacturers of rotary pumps; and the Butters Lumber Company of North Carolina.

"Also during that period he served as vice-president of the National Cotton Manufacturers' Association, a governor of the American Civic Federation, member of the welfare committee of the National Civic Association. For many years he was an important factor in the granite industry, the company with which he was connected supplying all the stone for the Pennsylvania terminal in New York and the Hanover Bank Building. . . . In 1903, he married Miss Lillie Duncan of Lexington, Ky., in that city, in a ceremony that was one of the social highlights of the East that season. They had three children before their separation in 1911, followed two years later by their divorce. In 1916, at probably the height of his active career, he dropped his business ties to join as a private in the 7th regiment of New York, subsequently seeing active service on the Mexican border. When the United States entered the world war he tried to join as a private, but was refused. He then entered Massachusetts Institute of Technology for study and later received a commission as captain of ground aviation, serving abroad. While in the army he wrote two pamphlets, one on airplane navigation and another on the use of the compass in planes, both of which became army manuals. . . . Long known as a 'free thinker,' he won widespread attention in 1906 when he advocated a change in the then existing child labor conditions, in an address before a gathering of New York state cotton manufacturers. In his proposal he advocated

1887 Continued

compulsory part-time education for employed children, requiring at least half of each day in school. Again his freedom of expression centered attention on him when he published a pamphlet, 'Searching for Truth,' in which he attacked the religious ideas and ideals of bygone years. The work has been widely read by both theologians and free-thinkers. Many have condemned it, even to the point of arguing for its suppression. Another of his published works was 'Still on the Search,' a commentary on human nature. . . ."

Walter S. Moody, VI, passed on at his home, 155 Dawes Avenue, Pittsfield, on November 7. From the Associated Press of that date we announce the following: "Walter S. Moody, seventy-four, retired engineer, head of the transformer division of the General Electric Company and a pioneer in the electric industry in America, died today at his home. Born in Chelsea, Sept. 20, 1864, he was graduated from Massachusetts Institute of Technology in 1887, the institution's first electrical engineering class. He taught for a year at M.I.T., where he met William Stanley, inventor of the transformer, who was then demonstrating an alternating current system. He came to Pittsfield in 1908. He also had charge of the transformer building at Fort Wayne, Ind., and the Lynn plants of the General Electric Company."

Carter wrote on October 14 that he had that day received word from Julian Cameron that he had consented to serve as one of the trustees of the class fund in place of Edward O. Goss, deceased, the other trustees being Carter and Cole. This fund, established in 1898 for the benefit of such members of the Class as needed assistance, has been a source of great pride and satisfaction to its founders, as well as a blessing and comfort to its beneficiaries. During its 40 years of existence it has disbursed about \$9,000 to needy sufferers in the Class, and it still stands ready to function at any time.

The Secretary was greatly pleased to learn a short time ago that Mrs. Hollon C. Spaulding was manager of the British Apprentice Club, Hotel Chelsea, New York City, where she informs the writer that she has been carrying on for 17 years. She writes that their only son, Forrest Spaulding, is city librarian of Des Moines, Iowa, and that she has a grandson in Chicago University and a granddaughter at Smith. She would be delighted to hear from any of Hollon's old classmates.

Mrs. Granger Whitney wrote on October 11: "These are very busy days, for we have a very large crop of apples and fine ones too. It has given me the greatest pleasure to tell the customers that on 12 plates of apples exhibited at the Northwestern Michigan Fair in September, we took eight first premiums, two seconds, and one third. We have always done well at this fair, but we never took so many firsts as this year. The young man in charge of the orchard was trained by Granger and he is full of enthusiasm." Congratulations from the Class at the showing of Red Oak Orchard!

Sturges, writing again from Santa Monica, says that he has gained five pounds on his present motor trip and never felt better in his life. He says: "Goss's death was most lamentable for our Class. He was a fine fellow and always gave his visiting classmates such a cordial welcome when they came to our reunions. Eighteen eighty-seven will greatly miss his geniality around our future dinners. It is certainly beautiful out here. The lease on my place in Chicago expires in April, 1939, and I think I will move out here and rent for a year and probably die here. It is a much pleasanter place in which to live than Chicago and much more economical. Six of my first cousins live in this vicinity and all are very happy here. There are 18 of us left, from 54 to 77 years of age, and about twice that number of second cousins scattered around."

The '77 class notes in the November issue of *The Review* take on an added interest to the members of '87 when read in connection with the very interesting letter of William C. Cushing, our classmate, publication of which was necessarily deferred until this issue for lack of space. His letter which follows will be of great interest to all: ". . . There are three M.I.T. stars whom I consider have emitted sparks of much influence in my professional career, and, be it noted carefully, all graduated in the Class of 1877. The first was George F. Swain, who was appointed head of the Department of Civil Engineering in 1886, and every member of '87 knows, without repetition, the remarkable intellectual influence he brought to the classes over which he presided. In the year 1887 the second star was George W. Kittredge, who at that time was engineer of maintenance of way of the Louisville division of the western lines of the Pennsylvania Railroad Company. He wrote to his classmate, Swain, that he was in need of an assistant in his department, and Swain passed the letter on to me to answer. I accepted the offer, and on the day after graduation I started for Louisville, Ky., where I became an employee of the Pennsylvania, which has proved to be for life, without interruption. That is the real reason for telling this story, as continued employment with a single corporation for life is to a certain extent unusual."

"The other member of this trio of '77 was Frederick W. Wood, who became the president of the Maryland Steel Company, which was one of the makers of steel rails for the Pennsylvania Railroad. Within the presidency of A. J. Cassatt, the control of this company, along with the Cambria Steel and the Pennsylvania Steel, was bought by the Pennsylvania Railroad Company and in after years disposed of. Traffic tonnage and intensity of wheel pressure on rails had increased so rapidly and become so great that intensified study of rail making became an organized work for railway engineers and metallurgical engineers of the railways and steel manufacturers for improvement in quality and strength. Connected with this work from the opening of the century

to the present day, Frederick W. Wood has been one of the leaders in rail research and methods of testing. I have been associated with him during the same period."

"Kittredge had already employed A. G. Robbins '86, but shortly after I became a member of the corps Robbins returned to Tech as an assistant, and Kittredge replaced him with William B. Blake, who has also been a life employee of the Pennsylvania Railroad, and we have been close friends and associates since Technology days, even to the extent of serving the other as groomsmen at his wedding. At the special recognition by the Faculty, last June, of '87 as the 50-year-old Class, George W. Kittredge was present at the Alumni Dinner, and we three — Robbins, Blake, and Cushing — marched to his table and saluted him as our chief."

"Within recent years I have had the pleasure of being received by Frederick W. Wood at his home in Baltimore. Many times I met Dr. George F. Swain at the rooms of the American Society of Civil Engineers in New York. This 50-year-out-of-Tech reunion has been noteworthy to me by the friendly handclaspings with those whom I have not met for a long time."

We mentioned in the November issue our sorrow over the death of James C. Hobart on August 15. We were unable then to give the brief sketch of Hobart's life which we present now as an excerpt from the Cincinnati *Enquirer* of August 16: "Although he and Mrs. Hobart had been traveling for the last year they maintained a residence at 4 Elmhurst Avenue, and had expected to return here in the fall. He was a son of William Newell Hobart and Elizabeth Babbitt Hobart. His father, a distiller who later founded the electric company of which the son became President, was for 18 years President of the May Festival Association. Mr. Hobart, a graduate of Massachusetts Institute of Technology, married the former Lucretia Winchell in 1890. He was at one time President of the Cincinnati Business Men's Club before its name was changed to the Cincinnati Club. He was a brother-in-law of Mrs. Lowell F. Hobart. Surviving Mr. Hobart are his widow, three sons, James C. Hobart, Jr., and Robert Hobart, San Francisco, and Everett W. Hobart, Cincinnati, and two sisters, Mrs. Richard Carter, West Newton, Mass., and Mrs. George J. Peirce, Palo Alto, Calif. . . ."

Here is another installment of Brainerd's interesting letter started in our notes last month: "At San Diego we spent six weeks. Palm Beach likes to claim that it is 'where summer spends the winter'; San Diego might as justly claim that it is 'where spring spends the winter, and autumn the summer.' Frost is almost unknown, and this summer the thermometer did not reach 80 degrees. Plants whose growth is governed by temperature bloom the year round; while plants whose blossoming is governed by amount of sunlight observe much the same seasons as with us. If you must have moderate heat, say 110 degrees, just go inland

1887 *Continued*

a few miles or on to the Imperial Valley, a half day's drive, where the temperature reported depends mostly on the length of the thermometer scale. The city itself is most picturesque, with the business portion on a low plain next the sea, while the residences are mostly on a high plateau cut by deep, steep-walled canyons. Some of the streets down into the canyons actually have steeper slopes than the roofs of the adjacent pitch-roof houses. The city is a good center for excursions. Ensenada [N.M.] is only 75 miles over the Mexican line and has many little shops filled with Mexican textiles woven in colors and patterns such as you may see in Peruvian and Mexican fabrics in the art museums. A few miles up the river valley is the Mission of San Diego, the first of the chain of Franciscan missions which, spaced a day's journey apart, extended to above the Bay of San Francisco. This is still occupied as a Catholic Indian school and orphanage. It was here that we first realized how many of our relatives and friends of New England origin had made their way across the continent until stopped by the Pacific Ocean and here settled. This was true all along the coast up to San Francisco." (To be continued.)

An interesting announcement is the fact that our old classmate Frank Solomon has been discovered at Daytona Beach, Fla., where he has resided since 1922. Frank writes interestingly of his life history in later years and informs the writer that he has reverted to the old family name of some two centuries ago, that of Salmon, which is now his designation. In the next class notes the Secretary will be glad to release his message, due regard for editorial requirements making such action necessary. In other words, these notes are long enough. — NATHANIEL T. VERY, *Secretary*, 15 Dearborn Street, Salem, Mass.

1888

Frank Stetson writes: "Nearly 60 years ago, in 1878 when a boy of 12, I spent the summer on Merepoint, Casco Bay, Maine, from which Chebeague Island, your summer home, is plainly visible, being only five miles away. Elm Island, made famous by Elijah Kellogg in his series of books for boys, is just opposite Merepoint, and its most distinguishing feature is a huge elm which separates about eight feet from the ground into six equal trunks, each quite large enough for a respectable tree." During the last 25 years while sailing around Casco Bay, your Secretary has noticed this gigantic tree and can vouch for Stetson's description of it. — On October 17 your Secretary left Chebeague Island to spend the winter in Cambridge. He will return to Casco Bay, May 1. — BERTRAND R. T. COLLINS, *Secretary*, 16 Chauncy Street, Cambridge, Mass.

1889

The Boston *Herald* of October 5 had the following about Sauveur: "The Boston chapter of the American Society for Metals will honor Dr. Albert Sauveur,

professor emeritus of metallurgy, Harvard University, at a meeting Friday night at 8 in room 6-120 at M.I.T. Dr. Sauveur, internationally honored for his researches, will speak on 'Pearlite,' one of the common constituents of steel. Dinner will precede the meeting at 6:15 in North hall, Walker Memorial."

Parker Fiske is so far recovered from his recent illness as to be able to walk out and wants it to be known that he is "still on the fighting line." He hopes to go to Florida this winter and sends his regards to all the boys. — Howard B. Emery's address is now 615 Grove Street, North, St. Petersburg, Fla. — The Secretary has received word of the death of George C. Kaufman but has no particulars. — William Lincoln Smith wishes now to drop the title "Professor," but he is still entitled to be called "Doctor" when you contact him. He is still at his old address, 4 Academy Lane, Concord, Mass. — Annie G. Rockfellow writes that she retired from the practice of architecture on May 1 and has moved to California, where her new address is 1620 Garden Street, Santa Barbara. Lucky girl. — WALTER H. KILHAM, *Secretary*, 126 Newbury Street, Boston, Mass.

1891

Our last issue of '91 notes was so voluminous that part of George Hooper's letter goes over to this issue. We know George will accept the good humor of The Review Editors in publishing his letter as a serial: "During July we made a short trip as far as Carmel but found that place and also Santa Maria, another favorite stopping place, warmer and more muggy than Pasadena, so that we did not stay long. In going up we took the newly opened coast road which might be a very beautiful drive were it not nearly always shrouded in fog. About 70 miles of this route is along the edge of the Santa Lucia Mountains, skirting the sea sometimes many hundred feet above the water. The driver sees very little of the scenery, however, all of his energies being devoted to driving the car up and down steep grades and around hairpin curves. My wife, who could observe the country, tells me that the combination of mountain and ocean scenery is very beautiful and the flowering shrubs and other vegetation, very decorative. At one point where the road turns inland to go back of a formidable mountain, there are a number of miles reminiscent of the Berkshires with deciduous trees, a flowing river, and many brooks. The Santa Lucia Mountains embrace a very primitive area with few settlements, very rough and hilly roads, the principal one descending over 3,000 feet in about four miles, and much wild life. Mountain lions and wild cats are sometimes seen by parties driving through and of course there are many deer. Well in the interior is a small settlement called Jolon (pronounced ho loan) with a mission, and a religious fiesta is held there at times.

"This will amuse Harry Cole: While at Carmel we learned of a great school of flounders and halibut having made its

appearance as we drove over to see the catching. Every vantage point was occupied by anglers, some of them so old and doddering that they had to have the help of younger men or of boys. All were pulling in rough backs, as they called the flounders, and occasionally great excitement attended the catching of a halibut. I saw one of these latter weighing about 90 pounds and another of about 50 pounds — huge halibut for these waters but mere infants beside those caught along the coast of Maine and merely minnows compared with those brought up by trawlers operating offshore along the New England Coast. I have been credibly informed that along the Scandinavian coasts it is no unusual thing to get halibut weighing over 250 pounds.

"In looking over my notes, I find that I perhaps omitted to tell you of the re-appearance of the sea otter on this coast, in the rather rough Santa Lucia Mountain district. This animal was once very numerous on this shore from Alaska down to, and below, Monterey. Its fur was of very fine quality and for that reason was eagerly sought by the Russians, who populated those regions up to about 100 years ago. They cleaned out the herds so thoroughly that it was thought for many years that the animal was extinct, and of the latest catches, single pelts sold for over \$1,500. It is singular to reflect that two of the finest quality furs — sea otter and seal — are developed by ocean creatures. In the hope that the animal might reappear, very stringent laws have been passed for its protection, a prison sentence being included. With little or no warning, therefore, and after about a hundred years' interval, several herds have appeared along the Santa Lucia Mountain shores. These herds are said to number from 40 to 100 individuals each. Photos of them have been taken from airplanes, and an enterprising individual has set up a telescope beside the highway, charging a dime a look at the animals in the surf and on the rocks several hundred feet below. We noticed his advertising sign when we drove up there but did not stop as the fog was too thick to allow anything to be seen." If other members of the Class enjoy George's letters as much as the Secretary and Assistant Secretary, these epistles are well worth putting in print and we look forward to more of the same, or a serial if George is willing.

A postal from Charlie Garrison in November tells of a birthday visit to his son and a drive to Palm Springs, Calif., in their new car: "We had a two-reef breeze behind us and later quite a gale. The desert heat since we came has been about 50 degrees to 60 degrees when we expected 90 degrees. Today not a cloud in the sky but still cold. We drive to the Salton Sea this afternoon." The picture on the postal shows a desert covered with groups of flowers of variegated colors. Some desert!

Walter Hopton wrote about the changes at Aiken Manor, Webster Lake: Houses have been built on the point where the summer pavilion used to be.

1891 Continued

Walter had a large wreath made of ivy leaves placed on Charlie's grave. He wrote again in October from Syracuse: "We had a post card from May (Mrs. Aiken), the forepart of July, which stated that they were having good business and good prospects. Lester and Phyllis and the grandson were here for ten days; most of the time Lester was in Canada consulting with the Canadian Ingersoll-Rand, Ltd., on accounting method. The boy is handling the job in good style. The grandson is a sturdy boy, good natured and active; light hair, blue eyes, smiling face — makes a beautiful picture. . . ."

Charlie Ricker's son (Jr.) was married on September 17 in Cleveland to Emily Ann Elliott Canfield. — Arthur Hatch is now living in the apartment hotel at 1277 Commonwealth Avenue, Boston, Mass. — William Lawrence is now located in Room 7-211, M.I.T., Cambridge. — Frank Howard has been appointed a member of the Massachusetts State Planning Board. He replaces William Stanley Parker, whose term expired. — Gorham Dana was reelected chairman of the Massachusetts Federation of Planning Boards at the 25th annual conference of the federation, held in Springfield on October 29. This organization includes all the local planning boards in the state, some 140 in number.

Here is the Secretary's story of the hurricane and flood at Providence: I was in the thick of it but didn't even get wet. I left the office a little before 4 p.m. on September 21, and it was blowing hard but no rain fell then or later. Went to the depot to take a train for Boston, found trains delayed, and phoned home (Brookline) that if much delay would stay in Providence. Waited at depot expecting a train to come along, and wind increased, reaching its height at about 5:30 to 6:00. Depot began to get crowded, and when water appeared in the square at about the peak of the storm, more people and autos escaped to the depot, which was on higher ground. The tidal wave swept up the bay, then up the river, and then having nowhere else to go, swept into the downtown section of the city.

The depot roof was stripped of its metal sheathing, skylights smashed, and lights and telephones were out of commission, restaurant closed, and there we were, a mob of people marooned in the depot, completely surrounded by five or six feet of water. No one was very excited, some singing, and some of us went out on the south side off and on and watched the water rise in the square and streets around the Biltmore Hotel and City Hall. It took about an hour for the water to reach a height of six or seven feet, completely covering all autos (several hundred) and nearly covering the busses and streetcars, extending over an area of 15 or 20 blocks.

People stayed in autos and stores until they were forced to wade to building entrances and reach higher levels. There was not much current or swirling, but numbers of people were helped to safety, only a very few lives lost in the city. All

this happened before dark and we at the depot could see the gradual rise of the water, the trees in the square blow down, with people escaping from their autos and the stores as best they could. After dark there were no lights, except autos around the depot, and in my own mind, not knowing what caused the flood, we were there for the night, with no place even to sit down. A Tech man never gives up, so I went outside, roamed around the autos at the station, found one that was unlocked, lit the inside light, made myself comfortable, and read the S.E.P.

After a couple of hours, the boys who owned the auto showed up and said they were going to try and pull out, as the water was receding. This had not occurred to me, and about 10:30 I walked across to the Biltmore Hotel and didn't even get my feet wet. It was about five hours from dry to dry. The hotel was full of people, no lights, so I set out for College Hill, found some boys with flashlights, climbed over dozens of fallen trees, and finally arrived at my cousin's. The Hill is the old residential section, streets lined with beautiful old elms, most of which were blown down — across streets, on autos, and against houses. The houses were not damaged seriously, chimneys down, and so on.

The story of what happened at the beach resorts of southern Rhode Island is too long to tell: Some entirely obliterated; hundreds of houses disappeared; and this is where most of the lives were lost. The force of the hurricane and tidal wave carried all before it.

Electricity, telephone service, and gas were out in the downtown section and in many towns and cities in Rhode Island for from one to two weeks. In some towns the water could not be used for drinking purposes for weeks. Except for a fire which destroyed several blocks in New London during the flood, there were no important fire losses. For several hours the fire department was helpless in downtown Providence. The New Haven Shore Line was out of service for two weeks or more, some 25 miles of track washed away between New London and Westerly, and at New London a large government vessel across the tracks. — My first experience with either hurricane or flood, and once is enough!

A recent letter from Francis Holmes to Barney follows: "Mrs. Holmes and I made our customary trip to New Hampshire this fall and did considerable driving around through the various notches and to other points of interest. The south shores of the western end of Cape Cod and Massachusetts and Rhode Island suffered very severely from tidal waves during the hurricane, and where there were trees, many of them were destroyed or badly damaged, but so far I have seen nothing which compared with the damage to forests in New Hampshire. Crawford Notch was a terrible tangle, and when this is cleared up it will look almost bare. Down the Pemigewasset Valley, shortly after leaving the Old Man, is just as bad for several miles. The Glessner Forest, a show place on the road from

Littleton to Franconia, is almost completely ruined, and they were stacking hundreds of logs — beech, birch, pine, and other evergreens — along the side of the road to be taken away 'if and when.' . . ."

The class notes had been sent in when we received, via Barney, a letter from Harry Young inclosing a letter from his daughter, our "class baby." This letter from Mrs. Holden is a vivid account of her experience in the storm and tidal wave. As Harry explains, Mrs. Holden has a summer home at Quogue, which is next to Westhampton, Long Island, and this general locality suffered as much as anywhere on the coast. The house is on the Dunes, a strip of land running along the south shore of Long Island, forming a series of bays between it and the mainland.

The letter was sent to Harry a few days after the storm. Mrs. Holden was in the house with her youngest son, Richie, 12 years old, and they had a narrow escape. Only six houses were left out of 150, and over 30 lives were lost. In her letter Mrs. Holden first tells of the hard drive from New York to Quogue late Tuesday, in a pelting rain. Then Wednesday, the day of the hurricane: "I was sitting sewing in Arthur's room after lunch and the wind started to blow and the rain came down. Rich called me to the living room, as a blind was blowing loose up there. I tried to shut it but couldn't push it back against the house, the wind was so strong, and I couldn't pull the other one toward me to latch the two together, so we got wire and tried to drive a nail and wire it, but the wire snapped in two. By then it was a real gale, but I was able to padlock the porch wooden doors on the ocean side of the living room. I called Josephine, and she and I worked outside and Richie and Margaret inside trying to close the downstairs shutters, which was a job because they were swollen from a week's rain and had to be hammered from the outside and inside. We did get them all, however, and it was becoming harder and harder to stand. Josephine's silk slip was torn in shreds and our clothes blew over our heads.

"I thought it was only a wind storm and never thought of the sea. I went upstairs to see about the blinds and heard screams downstairs and all the Robinsons were in our house — Mrs., Doctor, the colored maid, two children, and the de Chopna child, the Indian princess. The roof had blown off their house and the front walls caved in. They had all escaped unhurt but were hysterical. I gave them sherry and sweaters, and we were all in the kitchen when I heard the glass windows in our living room go and the rain poured in.

"We all worked to get the birds, pictures, and chair cushions into Eddie's room and I closed all doors upstairs in the bedrooms and told everyone to get into the garage. I drew water in pots and pans and shut the water off and threw the electric switch in case of fire. The wind seemed to get worse all the time, and I knew Mrs. Chopna was in the Parson's

1891 Continued

studio with a baby, and her roof would never hold and Jacquelin was screaming for her mother, so I said I would try to make their house and tell her I had her child safe, for I knew she would worry knowing she was in the Robinson house when it blew down. I got there, goodness knows how. I was blown down four times on the way over and I came back on my hands and knees, for I knew I had to get back to get Richie out.

"I was no sooner back than the waves and sea started washing down our driveway, and I knew we must get across the bridge to the mainland. Doctor Robinson, Mrs. Robinson, and their 200-pound colored maid went for their car. I had Richie, Josephine, Margaret, Terry, Jacquelin, Asuncion, and Marcia in my car.

"I backed out of the garage and the water was pouring over the dunes. I got almost to the Stevens' house on the corner by the bridge, but the water was so high my engine stalled on the dune road. I told them all to get out and run to Stevens' house for shelter. The Chopnas were there by then, so I delivered their child to them there, and Mrs. Robinson took her children then.

"I happened to see a milk truck standing at the corner and ran to the driver, who took me back to my car and we pushed her out of the deep water and, by a miracle, the engine started again. We had all been wading around up to our waists in water, Terry and Tony, the dogs, swimming after us wherever we went. Josephine, Margaret, Rich, and the dogs got in the car, Josephine making the sign of the cross continually and saying her prayers. We got across the Quogue bridge before the tidal wave came. My one idea was to reach Riverhead. We started on the Montauk highway, but a school bus full of children was blocked there with trees all around it and I got out and asked people if any car had come through from Riverhead, and I found one who said I could get there by the airport at Westhampton; so I started for the Quantuck bridge to Westhampton. The road was clear of trees, but waves were breaking over the bridge. I saw a car go over, so I followed, but once over I realized 20 cars were stalled in deep water on the other side. I turned as quickly as possible to get over the bridge again. The waves literally went over the top of the car and I couldn't see the bridge but I set the wheel straight and went over in low speed. It was our most dangerous moment of all, but the car kept going and we made it and so did the Robinson car that was following me. We had agreed to stay together.

"We made Vail's garage and heard the Quantuck bridge had gone, so we were one of the last cars to go over it. I hadn't any idea how much traveling was ahead of us and there was a hand pump at Vail's, so I filled up with gas as all electricity was off; that was lucky because he soon was out of gas entirely. We huddled against the wall in Vail's garage until the rain stopped. It was facing at an angle that took the wind and we felt safe.

"I was amazed when I got to the village to hear the water was up around the drugstore and people were floating in to the main street on roofs and boats. I saw enough commotion there to know things were very bad, so I found Joe Payne, the school superintendent, and told him if he would open the school I would take charge and bring food there. He and Randall went for the keys. I got three lanterns at the hardware store — all he had — matches, and candles. The marketman got his truck and I took all the bread he had, bananas, soup, coffee, condensed milk, and three bottles of Poland water. I went back to the garage for Richie and the maids and before I could get water boiling at the school the police began to bring in people who were being washed ashore from Westhampton on roofs and sticks. I can't tell you their stories for it would take too long, but we worked all night. I kept a list of the missing and the found and where they went from there.

"Richie was wonderful. I can't say enough in praise of the way he worked and helped. He never slept all night. Stanley, the Westhampton policeman who saved so many lives, needed a car, so I gave him mine, never expecting to see it again, but at four o'clock in the morning he brought it back still running. I was so relieved to see it because, by then, we knew the New York train had gone off the tracks and I felt we could get out someday in the car.

"I heard our house was gone with all the others but by daylight I decided to go and see, and since the Quogue bridge was still passable by foot, we all went back and the surprise of my life was when I saw it still standing and the houses down around it. I went in through the kitchen door and the first thing I heard was my canaries singing away. . . . At 12:30 Arthur arrived, having heard over the radio from Jane that Westhampton was wiped out. He was sort of glad to see us." — HENRY A. FISKE, *Secretary*, Grinnell Company, Inc., 260 West Exchange Street, Providence, R.I. BARNED CAPEN, *Assistant Secretary*, Early Convalescent Home, Cohasset, Mass.

1896

Charlie Nevin and Mrs. Nevin have joined the class to which Con Young and Abby belong. Charlie gave up his business office in Boston a while ago. Last year they went to California. This year he has rented his house in Newton, and he and Mrs. Nevin have departed for Florida for the winter. Their exact destination is unknown to the Secretary, but it may be that the Nevins and the Youngs will get together before the winter is over. Clark Holbrook is another classmate who journeys back and forth. During the summer he and Mrs. Holbrook are at Red Bank, N.J., and in the winter they are at Miami, Fla.

The Myron Fullers are off again. The Secretary has received copies of the *Brockton Daily Enterprise* of November 8 and November 14, containing letters which they have written. The first one

THE TECHNOLOGY REVIEW

described their stay in the Azores, which they had visited for the first time, as these islands are not on regular tourist routes. They report that the islands are very attractive and interesting. The second letter dealt with their impressions of Lisbon, Portugal, which likewise is a place seldom visited by Americans. They were particularly impressed by the spotless appearance of the city.

Charlie Tucker and Mrs. Tucker paid the Secretary a call on November 7. They had been away on a little trip and were returning home to North Andover. Charlie did not fare too badly in the September hurricane. About half of his peach crop had been gathered at that time, but the other half was a loss. It looked at the outset as if he would undergo a big loss on his apples, but through the marketing arrangements that were made the apples were quickly gathered from the ground and disposed of to the corporations which took over the contract of handling promptly the New England apple crop. The result was that Charlie, in the end, realized a satisfactory return and was relieved of the usual job of picking the crop from the trees.

Another vivid account of the hurricane has been supplied by Gene Laws. He and Mrs. Laws are on the old Laws farm outside of Fitchburg, Mass., carrying on some general farming operations but specializing in poultry. Both were there during the hurricane and did what they could to protect the property, but they admit that there was not much that they could do. The damage to their permanent buildings was small. There is a house on the farm which is unoccupied and which was built in 1768 by James Laws, Jr., of Billerica, who settled the Laws farm. This house went through the storm with the loss of only a few clapboards and shingles. This speaks well for the oldtime builders who put up structures to last. Laws was without electricity and telephone service for about three weeks, but neighbors who had milking machines and electric pumps were supplied with current somewhat earlier. The worst damage concerned the barn and woodland: The barn had about 6,000 square feet of roofing of galvanized iron, and about three-quarters of it must be replaced, which will cost \$700. Laws proposes to use asphalt roofing this time, as that will be less expensive.

Laws estimates that he has around 500 cords of timber and firewood blown down — pine, hemlock, oak, and beech, with a good deal of hardwood. He has been cutting cordwood and will have some logs sawed up into lumber, but the fire hazard in that district will be great until next spring.

Henry Waterman was selected by the Liberal convention in Yarmouth, Nova Scotia, on November 12, as its candidate as representative from Yarmouth County to fill the vacancy caused by the death of the Honorable L. C. Gardner, late speaker of the Nova Scotia legislature. Since the Conservative party decided not to place a candidate in this by-election scheduled for November 29, a seat in the House for Henry was practically assured. Henry is

1896 Continued

carrying out the promise that he made as class orator on our graduation day to participate in civic affairs. He has already served as mayor of Yarmouth. We who know Henry well realize that his constituency will have an able, honest, and hard-working representative. Henry, in his modest way, states that he is merely trying to be useful. He still regrets that he had to miss our last class reunion in 1936, but he is looking forward to being with us in 1941. CHARLES E. LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

1897

Last month our notes carried a short notice concerning the retirement of Rear Admiral Parsons. To this brief report we append a more complete account of the life of our distinguished classmate: Archibald L. Parsons was born in Derry, N.H., on September 20, 1875. He entered the naval service in March, 1903. Following his appointment in the Navy, Admiral Parsons was assigned to duty at the Mare Island Navy Yard and shortly thereafter he was sent to the naval station at Cavite, Philippine Islands, where he was placed in charge of the Navy's public works and public utilities. Returning to the United States three years later, he was assigned to duty at the Bureau of Yards and Docks in Washington, following which he was placed in charge of construction activities at the Naval Academy, Annapolis, Md., and later was sent to the New York Navy Yard. He returned to duty at the Bureau of Yards and Docks in 1912 and remained there until the end of the war period. In 1916 he was appointed assistant chief of the bureau. During the tenure of this office there was accomplished a tremendous expansion of the Navy's shore facilities representing an expenditure of approximately two hundred million dollars.

Early during the War, Admiral Parsons foresaw the necessity for greatly increased office space to house government activities in Washington. He strongly advocated the appropriation of funds for the immediate construction of suitable offices for the War and Navy Departments, which resulted in the construction of the buildings which they now occupy on Constitution Avenue west of 17th Street. He was in personal charge of the design and construction of these two buildings, which are joined by a bridge and which, at the time of their completion, had the largest combined floor area of any similar structure then in existence. Work was started early in March, 1918, and the buildings were ready for occupancy in the latter part of September of the same year. Parsons received the Navy Cross for his services during the World War.

In December, 1918, he was detailed to duty as public works officer of the Philadelphia Navy Yard and of the fourth naval district. While at Philadelphia he supervised the construction of the thousand-foot concrete dry dock, a particularly difficult work because of the treacherous subsoil conditions. Two years later,

Parsons was nominated by the President of the United States to be engineer-in-chief of the department of public works of the Republic of Haiti and was shortly thereafter commissioned in that capacity by the President of Haiti. During four years in that country, Admiral Parsons succeeded in establishing on a firm basis an efficient organization for the design, construction, maintenance, and operation of the public works and public utilities of Haiti and greatly expanded the activities of his department. Upon the completion of his tour of duty in Haiti, he was highly commended by the Secretary of State of the United States and was decorated with a medal of honor by the President of Haiti.

In August, 1924, Parsons, was detailed as public works officer of the New York Navy Yard, where he served until June, 1929, then being assigned to similar duty at the Boston Navy Yard. He was nominated by President Hoover on December 16, 1929, to be chief of the Bureau of Yards and Docks for a four-year period, and the nomination was confirmed by the Senate on December 18. Admiral Parsons took the oath of that office five days later. On December 23, 1933, Admiral Parsons was detached from duty as chief of the Bureau of Yards and Docks and was assigned to duty as public works officer of the third naval district, and on October 1, 1937, he was promoted from captaincy to the permanent rank of rear admiral.

We've been a little slow on the uptake in reporting the news concerning William D. Parker but not nearly so slow as Parker himself in creating this news. According to the *Boston Post*, in an October issue a year ago: "Declaring his companionship with a faithful Russian samoyede dog during the past decade has been superseded by his love for a youthful hometown girl, William D. Parker, 63, an M.I.T. graduate, and civil engineer for the State Public Works Department, surprised townfolks at Weymouth by filing intentions to wed Miss Eleanor M. Hollis. . . ." Shortly after this issue comes to you, Parker will celebrate the first anniversary of his marriage. — We hear with interest that Roger Horsford, who was with the American Telephone and Telegraph Company for so many years in New York City, has now retired and is passing his "declining days" in New Jersey (25 Lincoln Street, Glen Ridge). — Arthur L. Jennings, who was formerly in New York, is now in Atlanta, Ga., where his address is 537 Boulevard Northeast, Apartment 9. The writer understands that he is doing survey work, incidentally some of which is connected with a cemetery. We assume that he is very busy, as this has been a leading industry since the first inauguration of F.D.R.

George Wadleigh ran into Ed Hawkins in Rochester a short time ago and reports that Ed is in fine condition, busy working on investigations for Eastman Kodak Company. He has had a lot to do with the manufacture of the reflector buttons so commonly used today along the edges of highways. Recently he has been transferred to a department manufacturing

lenses. Hawkins said he hears from Frank Feely occasionally and reports Frank as having been very well in the last three or four years, but he gets to his plant for only a short time each day. George Wadleigh writes that most of his time for the past year and a half has been taken up with the completion of a 300-ton per day pulp and board mill near Charleston, S.C. Construction work has been largely reduced, and his department is spending most of its time on the betterment and improvement of manufacturing processes.

Although the death of Clarendon Nickerson on November 25, 1937, was reported in the customary column of *The Review* last spring, we have not mentioned it in our notes, so we take occasion now to express our regret. Nickerson passed away at his home at 73 Elmwood Avenue, Waterbury, Conn. — The writer projects a belated note (belated on the part of the writer) from Stanley A. Hooker, 661 Gholson Avenue, Cincinnati, Ohio. Stanley advises that all the pictures that he took at the reunion turned out very well and if you will send your address to me (see below), I will send the same to Stanley and he will be very glad to send you an enlargement of the group or the individual pictures with his compliments.

We received a letter from Edwin P. Osgood, which is quoted here in part: "Your delayed notice came forward to me here in Reno where I am busy not on a 'cure' — for my wife of 35 years is here with me — but on a Carson River adjudication of all water rights that I am putting through with our attorneys and the United States Department of Justice. . . . For many years I have been anchored in the Truckee-Carson irrigation district, the outcome of the first United States Reclamation service effort, the Newlands project, and have become somewhat educated in agricultural economics by ownership of two ranches. Under the process ancient history seems to take on some meaning and future history to become an absorbing speculation, Spain a startling milepost indicative of the future, and 'muddling' England the same old beloved muddler that has in the end done so many right things besides our Bill of Rights way back in 1689. As a director of the district I came near to waking our ranchers to our possibilities; if I don't weaken and do play good enough politics, we will yet get our power plant firm on water alone and hang onto it ourselves and perhaps even do some heating with it at below one cent a kilowatt hour. Otherwise the hope is still to strike a real 'mine' in a 'prospect' and get so foot-loose that I could tell the truth when it seemed desirable and appropriate and put across such ventures as seemed worthwhile. Nevada with its old bald-headed, geologically exposed hills of unnumbered colored hues is a very attractive home, but someday I will surprise you all by turning up at a reunion. . . ." We hope you do, Osgood! — JOHN A. COLLINS, JR., *Secretary*, 20 Quincy Street, Lawrence, Mass. CHARLES W. BRADLEE, *Acting Secretary*, 30 Kilby Street, Boston, Mass.

1899

C. B. Cluff of Cincinnati called at my office late in October. We had a nice little visit, and this time I could tell Cluff a bit about the New England hurricane to match his story of the last Ohio flood when streets ran five feet deep in water and pedestrians took to boats. Several men of the Class witnessed the hurricane at quarters too close for comfort, among them George Priest, your Secretary, Arthur Hamilton, Henry Eaton, and Carroll Brown.

W. A. Kinsman writes plaintively that he is always glad to hear from me, even though entirely on class business. He did say, though, that he plans to attend the reunion next spring. — Arthur Brown wrote briefly, giving the sad news of the death of John L. Tufts on October 24 at Worcester, Mass. Tufts died suddenly of a heart attack in the Y.M.C.A. gymnasium. He had been desk clerk at the Y for some time. — From Brown I learned that Ben Morse has been ill but has recovered and is feeling very well now.

Arthur Hamilton was reelected to the General Court of New Hampshire, as a representative of the people from his district. His avocation is making handmade furniture. — W. MALCOLM CORSE, *Secretary*, 1901 Wyoming Avenue, N.W., Washington, D. C. ARTHUR H. BROWN, *Assistant Secretary*, 53 State Street, Boston, Mass.

1901

In the December Review mention was made of the death of Henry Marcus at San Francisco on September 6. Subsequently Perk Parrock has sent in a short newspaper obituary which stated that Henry, who was in the refrigeration business in San Francisco, died while on a business trip to Glendale, Calif. The notice stated that Marcus was born in San Francisco, that he was graduated from M.I.T. in the Course in Mining Engineering, that he was well known as a philatelist, and that he was a member of the Union League Club in San Francisco. Surviving are his mother, his wife, three daughters, and a son. Perk also sent the following personal and most appropriate comment on the passing of our old friend: "I saw him about a month before he died when he was taking his family to live in a near-by apartment on Jackson Street. I met Mrs. Marcus and the two younger daughters, and we stopped to talk for a minute or two. Henry looked pale, I remember, but he stood erect, spoke quietly, and carried himself well. He was always like that — or has been since I came to California.

"I saw him once or twice at the Club where he liked to play a card game that I am not familiar with — a game of several decks and a tremendous number of cards lying about. In California even the card games are exaggerated! From me you may put Henry down as a gentleman, a scholar, and a good sport; in appearance gray, pale, dignified, bearded as in the old days — courteous always. *Pax tibi Henricus.*"

On a recent visit to Boston your Secretary enjoyed the pleasure of lunching with Bob Williams, former Secretary of the Class, and Willard Dow, the present Assistant Secretary. We had also hoped to have with us Ed Seaver and John McGann, but each of them had to be excused because of pressing business engagements. Furthermore, each of those gentlemen said that business is now showing considerable improvement, and that opinion was also concurred in by Bob and by Willard. Bob's concern, the Submarine Signal Company, is stated to have a lot of government work while Ed Seaver's company, the Foster-Wheeler Corporation, is finding a good demand in this territory for its condensers and other specialized machinery. John McGann stated over the phone that the bronze tablet and memorial business had not been too good but future prospects appeared more encouraging. Willard Dow, as usual, is right busy in helping important corporations make certain that they do not pay Uncle Sam more than is due that gentleman.

Your Secretary has also recently heard from another classmate of ours in the state of Massachusetts, Mary Abbot Holt, whom many of us recall as one of the ladies who helped to humanize the Class of 1901. Miss Holt writes that she is a retired teacher and that although she took only several special courses at Technology in general biology and botany, she had always felt that she had secured a certain widening of outlook which she definitely ascribed to the somewhat limited association she had enjoyed at M.I.T. Such brief comments from former classmates are most welcome and will always make more interesting the notes which your Secretary endeavors to prepare for The Review.

Phil Moore, who very briefly states his present occupation as vice-president of Poor and Company, Chicago, Ill., writes that he had a very pleasant day last summer with Bill Newlin and Mrs. Newlin, who as they stated, were engaged in circumnavigating the globe. (Bill, you will recall, is secretary of the faculty for Amherst College.) Phil then defined circumnavigating the globe as having been within the boundaries of the United States, which perhaps seems a peculiar way of doing the job indicated, but Phil went on to say that Bill's cool philosophy convinced him that he was as much a circumnavigator as was the man who flew about the globe on somewhere around the 75th parallel.

Al Sulzer, who is the efficient vice-president and assistant general manager for the Eastman Kodak Company at Rochester, N. Y., advises that he has plenty of problems in connection with the various plants of his concern in the United States together with the five factories which are located in Europe and the one in Australia. Al states that he is finding very interesting and enjoyable his five-year term as term member of the Corporation of M.I.T. Perhaps when Al joins us on the occasion of the 40th anniversary of the Class, he can find it proper to tell us some of the interesting details of the wonderful Corporation with which he

is associated. He should bring with him Charlie Flint who is also a vice-president of the Eastman Kodak Company and whom we all remember so pleasantly, although it is many years since we had the pleasure of seeing his smiling countenance. Charlie Tufts, who very briefly states he is vice-president of Allied Chemical and Dye Corporation, writes that he finds pleasure in looking over the class notes (many thanks) but unfortunately he does not include any special comments to be used in those notes. Your Secretary on one of his rather infrequent visits to New York will, therefore, hope to see Charlie and secure some other interesting data.

Ben Miller very briefly writes to state that William Collord, whose name has been carried on the address-wanted list for as many years as I have been receiving those lists, died more than 35 years ago. Collord did not remain at the Institute for the full term, but he surely must have been known to a number of the Class, and it does seem rather odd that his name could have been included on the address-wanted list for so many years without some comment from some member of the Class.

As a former resident of Massachusetts your Secretary still continues his subscription to his home paper, the *Natick Bulletin*, and in a recent edition of that paper was most sorry to find a notice of the death on October 22, of Charles Hardy Harris who was a very dear friend as well as classmate at high school and at M.I.T. The notice went on to say that Charlie — who was with Stone and Webster Engineering Corporation since he was graduated — was, at the time of his death, general engineer for the Virginia Electric and Power Company at Richmond, Va. Charlie is survived by his wife and two brothers. Years ago Charlie Harris and I constructed a telegraph line about a mile long between our two homes. Some of the insulators for the wire we attached to trees, but in addition had to cut about 15 poles, which my father consented that we should secure from one of his wood lots. Unfortunately, however, we boys made a mistake on the boundary line and cut all of the poles on the lot of a neighbor with whom my esteemed sire was not on speaking terms. The result was a lawsuit which was fortunately settled out of court and at not too great an expense to my dad, and the telegraph line was completed and for several years furnished a great deal of pleasure and interest to the two engineers who cut the poles, dug the holes, shinned the poles, and strung the wire. Incidentally, while we did become somewhat proficient as telegraphers, we also worked out a method of using the single wire for a telephone connection (that being before the time of the telephone monopoly) so that we could check up when the Morse code did not register coherently. Charlie and your Secretary joined in other adventures, and while we have been separated for so many years I shall always look back with pleasure on those days when we were having such a good time and looking for-

1901 Continued

ward for many worlds to conquer. — ROGER W. WIGHT, *Secretary*, The Travelers Fire Insurance Company, Hartford, Conn. WILLARD W. DOW, C.P.A., *Assistant Secretary*, 20 Beacon Street, Boston, Mass.

1902

Two of our classmates, Lind and Cates, have won honors in the broad fields of their professions. Lind has been nominated for the presidency of the American Chemical Society, and the brief sketch of his qualifications follows: "Samuel C. Lind, dean of the Institute of Technology of the University of Minnesota. Born in 1879, Dr. Lind graduated from Washington and Lee University, then the Massachusetts Institute of Technology, took his Ph.D. at Leipzig in 1905, and was a student at the University of Paris in 1910-11 and at the Institute of Radium Research in Vienna in 1911. He was assistant in chemistry at M.I.T., instructor and later assistant professor at the University of Michigan, chemist in radioactivity, physical chemist, and in 1923-25 chief chemist at the U. S. Bureau of Mines. He was associate director of the Fixed Nitrogen Research Laboratory in 1925 and 1926, leaving to become director of the School of Chemistry, University of Minnesota, where he remained until becoming dean of the Institute of Technology of the same university in 1935. . . . He was president of the Electrochemical Society in 1927, and is a member of the National Academy of Sciences, and of other scientific organizations. He is the author of many articles in the field of his special interest, and the inventor of the Lind interchangeable electroscope for radium measurements. . . . His work has been in the field of radioactivity, radium extraction and measurement, influence of radiation on chemical action, kinetics, and chemical reactions, photochemistry, and chemical effects in electrical discharge."

Cates, who is president of the Phelps Dodge Corporation, has been selected to receive the William Lawrence Saunders Gold Medal by the board of directors of the American Institute of Mining and Metallurgical Engineers. Under date of October 18, the New York *Herald Tribune* writes as follows: "In receiving this honor Mr. Cates, who began his mining career in 1903 as a timekeeper at the old Boston Consolidated, a copper mine at Bingham, Utah, joins the ranks of such engineers as the late John Hays Hammond, Daniel C. Jackling, Herbert Hoover, Walter H. Aldridge, Clinton H. Crane, and Pope Yeatman, who are among those that have received the Saunders medal. Mr. Jackling, president of the American Institute of Mining and Metallurgical Engineers, wrote the citation for the award. It names Mr. Cates's achievements as an engineer in the development of large-scale methods of mining copper ores, and as an administrator of mining and metallurgical enterprises.

"Born in Boston, Mass., December 20, 1881, Mr. Cates was graduated as a mining engineer from Massachusetts Institute

of Technology in 1902. Following his position as timekeeper, he advanced rapidly during the next seven years, until in 1910 he was made general manager of the Boston Consolidated. Mr. Cates was then appointed engineer of mines for the Utah Copper Co., which absorbed the Boston Consolidated. He became general manager of the Ray Consolidated Mine in 1913 and was recalled in 1919 to become general manager of Utah Copper Co. Mr. Cates was the first engineer to introduce on a large scale the undercut block-carving method for the underground mining of copper ore. While he was with the Utah company the open-cut mining operations were electrified and the concentration plants remodeled." — BURTON G. PHILBRICK, *Secretary*, 246 Stuart Street, Boston, Mass.

1903

Our 35th reunion still stays in our minds as a very happy remembrance. Our only regret was in not seeing more of the Class, especially those from farther off. Either Regestein and Bradshaw from Delaware or Ancona from Rochester came the longest distance, but others from New York City and even western Pennsylvania could have made the trip and returned comfortably over the weekend. However, these reunions have always been, and still are, pleasant occasions, and we hope will continue to be to the end of the class life. Myron Clark gets around quite a lot, making periodic visits to Indiana, and someday we hope he can persuade Morse, Potter, Scherrer, and Miller to come East with him to a reunion. We did have a note of greeting and regret from Jack Howard. Both he and George Swett seem always to be particularly busy right at reunion time and have not attended a class affair for a number of years. We miss them, and there are many queries about the present Tech which they could answer much better than even your representative on the Alumni Council. Various sons and daughters of the Class were graduated from colleges all over the country last June, and possibly some of their parents had to attend these graduations, cutting down on our numbers.

There have been several deaths in the Class recently and some we heard of at the reunion for the first time: Jessie Nelson Braley, principal of the Holman School, Ardmore, Pa., died in June, 1936. She was with the Class in 1902 as a special student in Course V. — George MacIntyre Macdonald, who was graduated with us in Course II, died in 1934. Lemuel Cushing Kimball, Jr., who took special work in Course VI and who later went into the brokerage business in Boston, died in June in California. — Stephen Nickerson Mason, graduating with us in Course X and for many years with the American Woolen Company, in Lawrence, Mass., died there in February.

Harry Clifford Crowell, I, died in July. Your Assistant Secretary and Crowell sat beside each other, by reason of our names, for four years. In June of

1903, together with Hayden, we got jobs with the Pennsylvania Railroad in Pittsburgh. I, having taken Massachusetts Civil Service examinations, was offered, and accepted, a job back in Massachusetts and left the railroad in August. Hayden also left, to go to the Philippine Islands, soon afterward, but Crowell stayed and spent his entire career in railroad work. He was transferred to Chicago, later coming east again by way of Logansport and Pittsburgh, and then to Philadelphia as assistant to the chief engineer. In 1929 he was transferred finally to the New York zone. His office informs us further that: "Among his duties Mr. Crowell represented the Pennsylvania and Long Island Railroads in many civic bodies in New York City and cooperated with the New York World's Fair 1939, Inc., in railroad matters, as well as the Eastern Presidents' Conference of American Railroads in connection with the railroad exhibit at the fair." He wrote me in 1933, that he believed "the old adage about the stone and the moss, and stuck and stuck and stuck. I am not sure about the accuracy of the old saw, but in these perilous days, 30 years of seniority offset the accumulated rust and are worth more than the small amount of moss gathered." *Railway Age* of August 6 carried a brief biography and a good picture of Crowell.

Frank B. Jewett, Vice-President of American Tel and Tel and President of Bell Telephone Laboratories, was awarded the 1939 John Fritz Gold Medal, the highest of American engineering honors, for "vision and leadership in science and for notable achievement in the furtherance of industrial research and development in communication." *Electrical World* of October 29 carried a brief write-up and a picture of Dr. Jewett.

Your Secretary, Newman, I, and Joyce, V, all traveled in various parts of Europe during the past summer, but reports from them will have to keep until next time. — FREDERIC A. EUSTIS, *Secretary*, 131 State Street, Boston, Mass. JAMES A. CUSHMAN, *Assistant Secretary*, 441 Stuart Street, Boston Mass.

1905

In our last issue we reported the rediscovery of Jim Barnes, VI, father of the Class Baby. We were about 600 miles off course, for another traveling Secretary, Bob McLean, II, made the discovery. Let Bob tell it: "You may be interested to know that this company that I work for was bought about the middle of June by The Murray Company of Dallas, Texas. I just made a trip South and while visiting the general offices in Dallas was introduced to a man by the name of Barnes and immediately upon being introduced I called him Jim, told him that he belonged to the Class of 1905, and that his boy was Class Baby. This kind of took Jim off his feet, because he didn't recognize me. I therefore told him I wanted a card so that I could send it to you and you could get him back on the active list. For your general information,

1905 Continued

The Murray Company has a department handling air conditioning, and Jim is the sales manager of this department, coming there directly from the General Electric Company, and while this is a separate department of The Murray Company, it is a part of the General Electric Company also. I had the pleasure of eating dinner at Jim's house and meeting his wife and daughter and also the Class Baby, who is now married, stands six feet four inches."

Hub Kenway, II, reports being royally entertained by Dan Harrington, X, at his beautiful home in the outskirts of Wilmington, Del., recently. Two of Dan's boys are with Du Pont and one is still in Princeton. Through Hub we also learn that Bill Green, VI, has just returned from Puerto Rico, where he had been representing the Daniel Hays Company as field marshal of its labor battalions. Bill is apparently quite satisfied to terminate his tropical life and wear ear muffs for a while. Because of information from the same informant, we anticipate for the next issue a nice report from Ben Lindsly, III, covering a vacation which he and Mrs. Lindsly spent in New Mexico camping at about 7,000 feet above sea level.

Ray Bell, II, reports that the hurricane of September 21 passed over his farm on Long Island and over the *Yankee* with no damage and no consequences worth mentioning "except no light, no running water, no icebox, no phone, no gadgets of any kind for five days." Never mind the gadgets, Ray, as long as our Sunday boat ride for next June is safe. — Andy Fisher, X, announces to the boys around Boston that Irving H. Cowdrey, II, is to address Andy's Men's Club at the First Church, John Eliot Square, Roxbury, on January 4. Andy doesn't know what the lecture is to be about, but he invites you to a chowder supper which he is to cook, inferring that after supper you won't care what Cowdrey talks about. — Russell Willson, I, now a captain in the United States Navy, has been transferred to London, England, as naval attaché.

Being Secretary has a great many compensations. One type is illustrated in a letter from Mrs. Ralph L. Segar, showing her appreciation of the floral tribute sent by the Class at the time of Ralph's funeral. Would that all of you could sense the satisfaction of the bereaved in feeling the uplift of the only thing we can give at such a time. Those who knew Ralph best might help to ease Mrs. Segar's loneliness by writing her of the bond and respect built in four years of companionship at Tech. Her address is 35 Spruce Street, Westerly, R. I. — FRED W. GOLDTHWAIT, *Secretary*, 274 Franklin Street, Boston, Mass. SIDNEY T. STRICKLAND, *Assistant Secretary*, 75 State Street, Boston, Mass.

1907

We open our notes with Sam Very's letter, continued and concluded from the December Review: "There, at Querétaro, directly opposite the hotel, in the great public square where twice weekly the town band regales the populace for two

hours, as, separated into the two sexes, the young people circumambulate the bandstand in opposite directions, I witnessed for the first time that interesting national custom, the 'sparking' of strangers' eyes, the public quest of true love. It is a pretty scene. The girls, arm in arm, marching in the flare-lit park one way about the blue-jeaned players; the boys in the outer ring about them, marching solemnly, sombreroed, in the other direction. Suddenly a black eye is conscious of a bull's eye, and, without a single other sign, the two pass on. Five minutes later they pass again, and this time two true hearts are beating in unison, but again they pass and again there is not the slightest indication that either cares about the other's emotion. On the third time round it is *au fait* for the girl to bow slightly and for the boy to remove his sombrero. If the meeting 'takes,' it is arranged, I understand, somehow, that the boy may secure a formal introduction, entitling him at some future time to serenade the lady from without and below her barred bay window. If this succeeds, he may be invited to meet her family; and at long last, if they permit it, he may court her seriously.

"The terrible earthquakes, some 300 temblors all told (mostly insignificant), which lasted between December 3, 1937, and January 3, found me in the 'City of Lakes,' which has no lakes, in an up-to-date apartment house which rocked so badly in some of these temblors that I counted many cracks aggregating 25 or 30 feet in length, the worst being one inch wide, through the solid masonry walls. I was taken by surprise in the first of these and sprang hastily out of a morning cat nap into a modest attempt to go properly clad to the street; but my legs missed my trousers again and again and I felt as sheepish as if I were on a liner in a No. 7 gale. This particular temblor was No. 7, I believe; that is more severe than the one which occurred in San Francisco in 1906. I understand that the substratum of Mexico City is a deep mud, quite spongy, and that no harm ever comes from its frequent earthquakes. That may be a comfort to some, but it has little to do with the psychology of a modest person trying to reach a public highway with his pants on.

"Learning in the nick of time that the 'genuine' 'Toltec' products made and sold in the same old way they were made and sold by the Toltecs, at the near-by city of Toluca, were actually leftover products whisked there for market day by rascally vendors of Mexico City who in Mexico City charge only a fraction of the Toluca prices, I passed up the allure of the route there through the 'Desert of Lions' which is not a desert and has no lions; and having had all I wanted, by now, of dysentery, doctors, and dirt, took train for Guadalupe, 2,000 feet lower in level, and there, at Lake Chapala spent the rest of the winter, reaching it the first week in January and leaving it during the bacchanalian orgies of the Christian Holy Week, the strangest anomaly of that most Christian of lands.

I do not regret this period of my Mexican initiation; it was full of 'color,' full of delight. And though the village of Chapala itself has practically nothing to offer a socially minded American traveler, I recall no place whose winter is more acceptable for the valetudinarian. The climate is perfectly delightful in winter. This is perhaps due to the altitude, over 5,000 feet, and to the high mountains engirdling the lake which is said in propaganda literature to be the largest lake in Mexico, some writers stating it to be over 70 miles long, others but 35 miles long. At any rate, I can testify to the peculiar atmospheric effect in winter there, which distorts the true distance of points on the opposite lake shores. At no time did such points, when not nearer to me than 15 miles away, seem to be actually over 2½ miles; they usually seemed much less. I often remarked that they seemed no farther away than the palisades do from the New York City shore; sometimes they seemed less far than Windsor Locks is from Warehouse Point, where I swam as a boy in the Connecticut, one-half mile. The lake at this season is a kaleidoscopic dream, no two periods of a quarter hour in the entire winter being alike. I doubt if any painter could give a true impression of the color.

"From the modern villa where I lived, one's eye may sweep the hills to the north of this lake for its entire length without finding a single discordant thing, anything not a part of the peace of the place. The cowherds who drive the lazy cattle to their grazing lands and back have the most visible animation, except for the warbling *chapitorins* at mating time who work much faster than the Querétaro swains. All this tranquillity was grateful after the internal agitations from the waters of San Luis Potosí and the external agitations of the terrible temblors of Mexico City. It was therefore conspicuously disturbing to learn, without warning, that in a day or two hence, on March 23, there was to be in that peaceful, happy, easy-going village of sun and equable winter a general strike of all of the 'syndicated' workers of the whole of Mexico to last one day in sympathy with the strike of the breadmakers, as a manifestation against the government. And on top of this news came word that directly across the lake, where the coloring was most gorgeous and the white clouds were fleeciest about the tops of the peaceful mountains which bumped the blue welkin there, at Manzanillo, 16 farmers had the night before been murdered in their sleep by 'agrarias' dissatisfied with the administration's allotments of the *ejidos*, the communistic communities which had been restored to 'the people' by fiat, in accordance with the requirements of the new constitution.

"Rumors grew with the approach of Holy Week, the fiesta of the whole year there, a period of gluttony. That they were the invention, for the most part, of peasant minds made them not a whit less disturbing, because the practical effect was potent. One rumor had it that the

1907 Continued

army had revolted; and we were in no position in Chapala to know, because news leaks in there one day, two days late. Another was that the peso was about to crash. Then came Cardenas' proclamation, on the 20th I think it arrived (it was dated the 18th), expropriating the oil properties, half a billion dollars' worth, it was said, and exhorting the people to preserve order.

"Paper was worth nothing, suddenly. I couldn't buy a carrot with a hundred-peso note. I had finally to go to Guadalajara and exchange every particle of paper for silver; and there but one bank was making such exchange then, though the crisis had already inspired hundreds of thousands of persons all over the land to convert millions of pesos into silver. There was a queue a quarter-mile long curling back and forth before those paying tellers' windows. There was a rumor that the governors of several of the states were on their way to Mexico City to present a joint ultimatum embodying their people's grievances.

"What will happen to the church," I asked an informed mechanic, "if there is to be a revolution?" "It will be its finish," he answered, and went on with his Holy Week preparations. Then came the exhortations of the two archbishops, the burying of the hatchet between church and state, and the adroit turning by Cardenas of all his other thorns into the iridescent halo he now wears. The 'general strike' he converted into a 'national adhesion day,' during which his army, in eloquent proof that it hadn't mutinied, enforced the closing of every store, every market, every saloon, every activity throughout Mexico. Antiforeignism worked wonders. The bishops agreed to help pay for the oil properties; the joint ultimatum of a few of the governors became delayed until the rest of the governors could join in the presentation of a memorial of loyalty. Several of the chief generals of the federal army publicly took the oath of personal allegiance to El General Lazaro Cardenas, the Savior of Mexico.

"The murders, lootings, and other demonstrations grew less all over the land, and the surly undercurrents at the meetings of disgruntled *agrarristas* were quieted. The bread strike failed. The leaders of the syndicated workers of Mexico angrily slunk back into innocuous retirement. Paper began once more to circulate in the tranquil village of Chapala. And the gluttonous preparations for Holy Week drew toward their proud conclusion. This brings us to Palm Sunday, April 12, when suddenly without apparent effort or preparation on anybody's part, the most tranquil, the most deserted village in Mexico became an organized fair with booths lining the cobbled streets, and Coney Island gaiety succeeded the sobriety and decorum of the winter funeral.

"*Mariachi* bands now appeared from the adjoining towns; and bootblacks, no less, swooped down to the golden harvest, as the *chapitorins* swooped upward to the dark-green foliage of the laurel

trees, for nesting time. Drummers came back from the rich land to the north, once a part of this Mexico which was to celebrate its Holy Week; their pockets were plump and their hearts filled with the generosity bred of plenty. With bottles of uncorked tequila in one hand they marched proudly at the heads of the *mariachis*, this way and that, past the tranquil villa where I lived, to the street of the principal hotels, where now hundreds of limousines were parked for the beginning of the week's festivities. They marched through the principal streets where the shopkeepers were doing a land-office business. They marched past saloons, until they had need to go in, from the smallness of a liter of tequila. Then, usually, they would march less well. But all this time when they stopped, so did the *mariachis*, but they never stopped their scraping; the violins and the guitars played on, gay tunes or sad ones, religious tunes or national ones; but they played on, always, at five centavos per player per tune. It was Holy Week and worth it.

"And sometimes, just before the plutocrats couldn't march any more at all, they would stop in front of somebody's nice villa and let go of the internal ecstasy, and like the Romans of old then start all over again until . . . the wife, poor saddened dear. . . .

"Exactly a month after leaving this Chapala, this Mexico, the bull of San Luis Potosí declared the state of San Luis Potosí in secession from the Republic of Cardenas, his friend. And exactly two weeks after that, Saint Nick, comes that handsome handwriting of yours requesting this intimate history of the sequel. Well, it's this: I'm in God's country, now, to stay awhile. For between the 'air-conditioned' Pullmans and the quakes and the '*aguas destilada*' and the revolutions and the Holy Weeks of Mexico, there's no tranquillity in a peace-loving mind.

"Thanks ever so much for the list you have sent; I promise, if you can ever forgive me this one, to send you another 'report' after I have concluded my inspection of my classmates during the transcontinental trip I hope to take this summer."

Through the personal effort of Henry Martin in New York we have received "at long last" a direct message from Arthur H. Jansson, graduate in Course XIII. From 1907 to 1909 he was an assistant to Professor Hovgaard in the naval constructors' course at M.I.T.; 1909 until 1912 at the United States Model Basin Navy Yard, Washington, D.C.; 1912 until 1917 at Fore River Shipbuilding Company, Quincy, Mass., and Welin Marine Equipment Company, Long Island City, N. Y.; 1917 until 1921 with Munson Steamship Company at New York, Baltimore, and Newport News; 1921 until 1936 with Penton Publishing Company, New York and Cleveland, as editor of *Marine Review*; since then in the design unit with George G. Sharp, naval architect for the American Bureau of Shipping (corresponding, we understand, with

Lloyd's of London), office at 30 Church Street, New York City. Arthur has written many technical articles on ship construction and operation for the *Marine Review* and *American Year Book*. He was married in 1916, has no children, and his home address is Apartment 611, 85-10 Thirty-Fourth Avenue, Jackson Heights, N.Y.

Martin also called on Charles W. Coffin (remember him in the Tech Show?). From 1907 to 1919 Charlie was with the Board of Water Supply of the City of New York on the staff of Walter E. Spear '97, chief engineer, working on Long Island's water resources in Nassau County with office in Babylon, Long Island, and in New York City. Since 1919 he has been with the Guaranty Trust Company of New York at 85 Cedar Street, corner of Broadway, on the second floor in the industrial department, where he runs some sort of a school for employees. Martin says he looks well, has snow-white hair.

Henry also writes that last June he met Robert K. Taylor on the street. Bob is supervising engineer on the new section of the New York City-owned Sixth Avenue subway extension with office on Sixth Avenue near Eighth Street. He has been connected with city departments of transportation or public works in Boston, Philadelphia, or New York nearly all the time since 1907. His home address is 2725 Marion Avenue, The Bronx, New York City.

Parker Dodge advises that Edwin C. Richardson, II, is married and lives at 420 Mount Stephen Avenue, Westmount, Montreal, Canada. At one time he was managing director of the St. Lawrence Welding Company, Ltd., but we believe that this company no longer exists and that Richardson is with some oil company, but this is quite indefinite. Unfortunately we have been unable to get any direct word from E. C. Also through Dodge we learn that Frank S. Hamilton, III, has retired from his (to us) little-known activities in mining and real estate, and has gone back to, and made over, his old home place in North Brooklyn, Maine. His post-office address is Blue Hill, Maine. He is married but we know nothing about his family.

Regarding himself, Parker wrote last August: "Besides two in college I have five more — three in high school, one in junior high, and one in elementary school. . . . Fortunately, I have some patent work of more than average importance and so keep a jump or two ahead of the fate that sooner or later will overtake us all — Harry Hopkins. My oldest boy, John, is a junior in the college at Johns Hopkins, and Frances is a sophomore at Gettysburg College. Charles, the sailor, is in his last year at high school and wants to study naval architecture at M.I.T. . . . There is another boy a year behind Charles, but imagination has not taken me so far as to plan for him." — BRYANT NICHOLS, *Secretary*, 126 Charles Street, Auburndale, Mass. HAROLD S. WILSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1909

Thirtieth reunion, Oyster Harbors Club, June 3 to 5. — Last month we reported that Allen Jones had just been elected general chairman of the Textile Operating Executives of Georgia for the coming year. In a letter recently received, he states that he is also vice-chairman of the Southeastern section, American Association of Textile Chemists and Colorists. For the past five years Jones has been superintendent of the Muscogee Manufacturing Company, Columbus, Ga. Allen's daughter, Jane, was graduated from the University of Georgia in 1936. His older son, Allen, Jr., was graduated from the Citadel, Charleston, S.C., in civil engineering in 1938. The younger son, Cadwallader, entered Citadel this fall.

Business Week of October 29 carried a photograph of four officials of the Chrysler Corporation, including our own B. Edwin Hutchinson, Treasurer, with the statement: "The hand-shaking orgies of politicians have nothing on those motor magnates at this time of year as they court the favor of the public for their companies and their cars. Last week four officials of Chrysler Corporation were on their feet for twelve hours as they greeted 2000 guests at a preview of the new cars in Chrysler Building, New York City." Nice going, B!

Chet Dawes writes: "My son, Laurens, graduated from the Harvard Business School in June, 1937, was married last December 4 to Ruth Johnston of Yardley, Pa. (Radcliffe '36), and is now in the accounting department of Munsingwear in Minneapolis. Jane was abroad last summer and is now a senior at Wellesley. . . . Jim Critchett has been appointed to the committee on patents of the American Engineering Council.

"I note that our 30th reunion is planned from June 3 to June 5. I am glad to learn that it comes early in June, for Jane and I are going to California the latter part of the month, primarily to attend an American Institute of Electrical Engineers convention at San Francisco, to which I go as a delegate. We also plan to see Salt Lake, Yellowstone, and other parts of the country, coming and going. You will recall that in 1934 I missed the 25th reunion on account of a similar convention at Hot Springs, Va., at which I was scheduled to read a paper. I note with considerable interest that Dale Ellis has a flagship. I have a 30-foot cruiser at Boothbay Harbor and would like nothing better than to have it available at the reunion at Oyster Harbors. However, it is a long distance from Boothbay Harbor to the Cape, and the fact that my time is rather crowded in early June would make it impossible for me to bring it there."

John Nickerson very kindly sent me a clipping from *Connecticut Industry* stating that he has just been named as one of 21 members of a textile committee, first under the wage-hour act (now known as the Fair Labor Standards Act), who will be called upon to make studies and recommend minimum wages for the nation's 1,300,000 textile workers. The commit-

tee consists of seven representatives of the public, seven representatives of the textile employers, and seven representatives of the workers. John is one of the employer representatives.

I was glad to hear from King Bullens, who is still boss of the New England Auto Products Corporation in Portstown, Pa., where they make Universal joints and drives for automotive, marine, and power transmission requirements. King's special hobby, which he says takes a lot of time, is the Army Reserve work in which he is lieutenant colonel and a senior reserve officer for the Philadelphia ordnance district. He is also president this year of the Philadelphia Ordnance chapter of the Reserve Officers Association, United States Army. Nevertheless, he has found time to write two volumes on "Steel and Its Heat Treatment," the first of which on "Principles, Processes, Control" came out last October; Volume II on "Engineering and Special-Purpose Steels" is to be ready this month. Bullens' daughter, Peggy, was graduated from Vassar in 1937 with Phi Beta Kappa honors. She was also captain of the varsity fencing team and is now teaching school in Connecticut.

From faraway Houston, Texas, comes a welcome letter from Arthur Hartwell, President of the Hartwell Iron Works: "As I failed to see you on my recent visit in the East, I am going to take this opportunity to send you a brief line. I dropped in your office before noon on October 13 and greatly regretted to find that you had not returned to the office from over the holiday. I had expected surely to go back, but the remaining days in Boston were so filled that I did not succeed in accomplishing this. Unfortunately it seems that the officers and members of our Class do not travel to these parts (or at least I have not had the pleasure of a visit from any) and my visits to Boston . . . have been all too infrequent.

"It would have been most pleasant to have had the opportunity of chatting with you for a bit, although I really had very little news to pass on to you. My family is growing up fast, and Mrs. Hartwell and I are naturally very proud of our flock. The oldest son, as I think I wrote to you, was graduated in mechanical engineering from Rice Institute, here in Houston, and he has now been married almost three years. The older daughter is now in senior high school, and the younger daughter and the two small boys are in junior high school. Should you hear of any classmates traveling this way, please be sure to ask them to look me up and if possible to let me know in advance of their coming so that I may be able to arrange a little more time to see them. . . ." — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. *Assistant Secretaries*: PAUL M. WISWALL, MAURICE R. SCHARFF, New York; GEORGE E. WALLIS, Chicago.

1910

The following clipping is from the Boston *Herald*, November 1: "Miss Eleanor Greene, daughter of Mr. and Mrs.

Charles E. Greene of 329 Highland Avenue, Winchester, has been elected president of the freshman class at Mount Holyoke College. Miss Greene, a graduate of Winchester High School, heads a freshman class numbering 270 girls." — The writer had the pleasure of meeting Larry Hemmenway when he was in Boston on business recently. Larry is living in New York and has given up ever coming back to Boston to live.

The Secretary had a letter from Harold Akerly and was pleased to hear that Harold has a daughter attending school here in Boston. The writer hopes to have the pleasure of seeing this young lady in the near future. — Louis French and his wife spent three days in Boston during November in order to attend the wedding of their daughter, Eunice, who was married in Pawtucket on November 26. She has been studying for her degree of doctor of philosophy at Brown University. — HERBERT S. CLEVERDON, *Secretary*, 46 Cornhill, Boston, Mass.

1911

Just as we had hoped, it turned out to be a natural — that choice of Jack's and mine to hold this year's fall dinner on the seventh day of the 11th month — for we had two elevens there, lacking just one man (and Aleck Yereance phoned late in the day he couldn't come). Yes sir, 21 '11 men had a fine class dinner in the Silver Room of Walker Memorial, witness: Joe Aaron, Ernest Batty, Obie Clark, Marshall Comstock, George Cumings, Alf de Forest, Dennie Denison, Henry Dolliver, Tommie Haines, Jack Herlihy, Charlie Hobson, Art Leary, Charlie Linehan, Roger Loud, Tom McLaughlin, Roy MacPherson, Bog Stevens, O. W. Stewart, Ted Van Tassel, Emmons Whitcomb, and Gordon Wilkes. As is very often the case, the mechanicals led with six representatives, closely followed by the electricals with five, the civils with four, three from Course X, and one each from IV, XIII, and XI.

An interesting feature of the "talk-around," which followed one of Bert Bridges's fine steak dinners, was the discussion of family statistics, and the big cheer came when we found we had one grandfather present: Ted Van Tassel! With three bachelors and two benedicts who had no children, it developed that the 16 fathers present had sired 17 boys and 16 girls, with the crown going to O. W. Stewart, I, who has four fine boys: one M.I.T. '39, one Amherst '40, one at Huntington School, and the youngest (12) in grade school in Hyde Park. O. W., as you know, is now manager of the inspection department of the Associated Factory Mutuals, and he gave us a most interesting account of the extensive damage among his clients' factories during the New England hurricane of September 21.

In the three-youngster group we handed the palm to Jack Herlihy, II, who has three children in college simultaneously. Young Jack is M.I.T. '39, his sister is Jackson '41, and his younger brother is B.U. '42. Genial John, ever

1911 Continued

since graduation the youngest looking man in the Class, is a perennial with Boston Edison, having been associated with that company always.

Marshall Comstock, VI, has two boys and a girl. His oldest girl is Radcliffe '39, and his other girl is this year a freshman at Furman University in Greenville, S.C. The "baby" in the Comstock family is a boy, 14, a student in Medford High School. Marshall is with Wagner Electric Corporation in Boston and proudly displayed at the dinner a clipping from the Boston Evening American of October 20, which had a picture of his oldest daughter and said: "Barbara Comstock of Medford, Radcliffe senior, is the typical college girl. Barbara, you see, is just a bit over 5' 4" tall and weighs 126½ pounds, all of which rightfully entitles her to the typical title. According to Ernest J. Radford, Massachusetts State College physician, who examined some 340 freshmen, the average weight of 'Miss Co-ed' this year is 126½ pounds and her height 5' 4.4'."

Ted Van Tassel, X, only recently returned from the Middle West, where he has been for a number of years, also reported two girls and a boy. His oldest daughter has been married nearly two years and has a ten-month-old son. Ted's younger daughter is in Newton High School now, while his big boy is a freshman at the Chicago College of Osteopathy. Ted gave us an interesting description of the processes and the tremendous quantities of liquor manufactured annually by Hiram Walker, Inc., at Peoria, Ill., where Ted has been plant and maintenance engineer, telling us that he thinks that Hiram Walker's newest plant there in Peoria is the most modern industrial plant he has ever seen and one that should be visited by everyone who happens to be in Peoria. Ted is back at his old family home, 390 Newtonville Avenue, Newtonville, Mass., and at present is perfecting plans for practical applications of two new patents he has for tanning leather and shoe construction. *p. s.* Ted brought no samples from the Middle West, alas!

Also reporting in the three-youngster group was your Secretary who has one boy, Bowdoin '41, a daughter taking a postgraduate year at Worcester Classical High School, and a young boy in Woodland Prep, also in Worcester.

Alphabetizing the two-youngster group we find Alf de Forest, XIII, with a son now connected with the Magnaflux Corporation in Chicago — a company specializing in the study of defects in iron and steel, which Alf himself founded — and a daughter, who was graduated from Barnard College last year and is now a first-year medical student at Tufts College. Alf says he is continuing to enjoy hugely his work on the faculty at our Alma Mater, adding that the hurricane felled a great number of trees in the 60-acre pine grove at his country place in Marlboro, N.H.

It sure was fine to see Henry Dolliver, I, valuation engineer for Jackson and Moreland of Boston, for on many, many occasions he has been out of town on one

of his numerous trips when 1911 dinners rolled around. Henry's oldest girl, a graduate of Massachusetts State College this year, is now at the Pierce Secretarial School in Boston, while his younger daughter is in Belmont High School. Tommie Haines, II, like Jack Herlihy an Edison perennial, also has two girls. The older, a graduate of Pine Manor Junior College in 1935, is now an assistant designer in Filene's Boston store, while his younger daughter is in Newton High School. Tom had a thrilling tale to tell of the herculean task his outside men had in restoring service to Edison customers after the September hurricane which hit Metropolitan Boston hard.

Charlie Hobson, X, now President of Wintermaster, Inc., 22 Tudor Street, Cambridge, has a boy who is a senior at M.I.T. this year and a younger daughter still in the grade schools. Roger Loud, VI, another Edison representative, has a boy who has just entered M.I.T. this year and a younger son in grade school. Roger says his younger boy is even now much interested in science, and both the boys share Roger's enthusiasm for astronomy.

Gordon Wilkes, II, our other representative on the Tech Faculty, has two boys. His oldest son was graduated from M.I.T. in 1937 and is now working at the General Electric Company. The younger boy is at Rivers School in Brookline. Gordon told us his heat-treatment laboratory has been moved into the new Rogers Building on Massachusetts Avenue, and he said he was anxious for classmates to come and see the new building and to see him in his new laboratory.

Alphabetizing the list of fathers of one youngster we find Ernest Barry, II, who has a daughter living at home, having been graduated from Dean Academy in 1937. Ernest is construction superintendent and maintenance engineer for Lincoln Stores, Inc., with headquarters in Quincy, Mass. Charlie Linehan, I, has a four-year-old daughter, whom we were favored to have with us at the famous Silver Anniversary at the Mayflower Inn, Plymouth, in 1936. Charlie continues his teaching duties at the Rindge Technical High School in Cambridge.

Tom McLaughlin, I (remember him?), appeared at this dinner — his first class function since he transferred to Yale in 1909. Despite his snow-white hair or perhaps because that lends itself so well to his jaunty Irish style, I recognized him at once and he was immediately eager to know if his old friends — he reeled them off (Parker, Larry Odell, Yereance, De Florez, Hopkins, Kenney, Williams, Robinson) — were apt to be present. He is a graduate of Yale Law School — played some baseball at Yale in Ted Coy's days of football and baseball fame. He now practices general law and has his office at 177 Huntington Avenue in Boston. His daughter, 21, is a radio entertainer, and if she can tell stories half as well as her dad did at his comeback appearance, she should go far. Welcome back, Tom!

Roy MacPherson, II, has one married daughter but assured us that he feels that his ambition to have a son is practically

gratified in that Mollie's husband is just like an own son to Roy and Ina. Mac is commodore of the Quincy Yacht Club currently and reported that during the hurricane there were 156 boats tied up there and they lost but two — a splendid tribute to the skill of Quincy members. Out in Framingham he said there were 49 trees down in the grove at the rear of his property.

Emmons Whitcomb, X, who has one son in his teens, gave us some most interesting facts concerning aviation's part in helping restore order out of the transportation chaos created here in New England in late September. Emmons, New England agent for United Air Lines, with headquarters at 18 Providence Street, Boston, said that the hurricane did more than any amount of paid advertising would do to interest the people of the East in air travel.

Obie Clark, II, still with Nelson Cement Stone Company, Inc., in Braintree, Mass., and Bog Stevens, IV, with Edward N. Pike, consulting engineer, 38 Chauncy Street, Boston, completed the list of benedicts present, while the bachelor clan was represented by Joe Aaron, VI; Harry I. Kessler, public accountant, 73 Tremont Street, Boston; George Cumings, VI, of the New England Tel and Tel engineering staff; and Art Leary, XI, mathematics teacher at Boston English High School. A fine time was had by all at this "Seven Come Eleven" party, including the enjoyment of the bowling which formed the conclusion of the evening's festivities. There was time for but two strings, Henry Dolliver having the high single, 110, and Gordon Wilkes having the best two strings: 104-101, 205.

A fine letter is at hand from A. T. Cushing, I, 902 Grand Avenue, Kansas City, Mo., who said the notes in the November Review contained quite a bit about 1911 children, so he came to bat with: (1) Daughter Emma Mae, who graduates next June from Southwest High School at the age of 16 and will go to college; (2) Son Don, 14, who is a sophomore at Western Military Academy, Alton, Ill., where his interests are science and radio; (3) Son Gerald, eight next month, who is finishing second grade in Troost School here. I really got a great kick out of Cush's "tag" and I hope you will too: "I guess their dad is an old fogey. Saturday night, in my car, I took Emma Mae and some girl friends out on a scavenger hunt in connection with a Halloween party and later learned that one of the girls said afterwards that it was no fun going out in a car with 'old folks' — they drive too slow, she said, and don't give thrills by sudden brake applications as do high school boy friends. Flaming youth of 1938!" — Cush is valuation engineer in the Kansas City office of the Bureau of Animal Industry, United States Department of Agriculture.

On his reply card, Alf de Forest, who attended the dinner, advised that he was working up a method of measuring impact strain waves which travel at 17,000 feet per second in steel. He has a three-element 3,000-volt cathode-ray oscillo-

1911 Continued

graph and associated amplifiers giving results at 5,000 inches per second of record speed. He presented a paper and a demonstration to the International Congress on Applied Mechanics in September.

Morris Omansky, V. consulting chemist with Arthur D. Little, Inc., Cambridge, was unable to attend the dinner, but wrote on his reply card: "Will give four lectures on rubber chemistry and industry at M.I.T. for Massachusetts University Extension Service. John Urquhart, XI, is production manager at International Shoe Company, Manchester, N.H. I see him occasionally. He has retained his good looks."

There you have it, mates, a real newsy set of notes, but — aye, there's the rub — what would they have been if Jack and I hadn't planned our annual November class dinner? Answer: just the letter from Allston Cushing out in the Show-Me State. Mmm-mm . . . that's it: Write to Dannie! And I do mean you and YOU! — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Worcester, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford, Mass.

1912

A letter from Herbert W. Hall, VI, apprises us that Herb is president of the Detroit Briar Pipe Company, engaged in the manufacture and distribution of a new one called the Kool Puf Air Conditioned Pipe. In Detroit alone, he says, they have sold over 25,000 of these pipes in the short time they have been in the business, and over 400 of these have gone to doctors, who will smoke no other kind, on account of the health angle. . . . And your Assistant Secretary hereby acknowledges that Herb sent him one as a sample, and it seems to have everything claimed for it. Since the prices are quite reasonable — from a dollar up — they ought to sell a lot of them, and we hope this free write-up in the 1912 notes will bring in a few inquiries from some of our pipe-smoking classmates. The address is 155 West Congress Street, Detroit, Mich.

Ernest Nicholson, I, called us up at our New York office right after the appearance of the November issue of *The Review*, to complain about the absence of 1912 notes in that issue. Well, we're always glad to know that we have eager readers, even if most of them expect us to fill this column out of our own heads, without any word from the members themselves.

H. E. Dexter, VI, was a visitor at the editorial offices of the *Electrical World*, according to Henry G. Dooley '20, who is managing editor of that publication. But evidently Dexter didn't have time to stop in and see your Assistant Secretary, or else he felt he didn't have any worthwhile news to give us for these columns. — A. M. Eisenberg has at last been located and can be reached care of the Musicians Union, 1265 Sixth Avenue, New York City. He is now Dr. Adolphe M. Eisenberg — to you. — FREDERICK J. SHEPARD, JR., *Secretary*, 125 Walnut Street, Watertown, Mass. DAVID J.

McGRATH, *Assistant Secretary*, McGraw-Hill Publishing Company, Inc., 330 West 42d Street, New York, N.Y.

1914

Happy New Year — and may your first resolution be to attend our 25th reunion, June 3 to 4! — "Perfumes and Cosmetics with a Parisian Accent" — that is Ted Gazarian's newest enterprise. And you should see the illustration on the announcement. Ted has added this new business to his already extensive line of importations. Headquarters of the new establishment is in Boston and operates under the name of Le Sonier, Inc. — E. C. Wentz visited Cambridge recently to attend the convention of the Acoustical Society and took time out to call on your Secretary. Wentz is one of the country's leading authorities on sound reproduction and has developed a series of new horn designs, as is evidenced by the almost continuous list of patents issued to him, another of which, covering a horn, has just appeared.

On the evening of November 22 Dean Fales delivered his annual talk before the New England section of the Society of Automotive Engineers and as usual discussed the various features shown on the new models at the Automobile Show. Dean is still yearning for a model built like a steamroller, with the speed of a Douglas sky liner, and at a price a professor can afford. — All classmates will be happy to know that Porter Adams is improving and has been able to drive around the country again. He is hoping to be able to get away to spend the winter basking in Florida sun.

Your class officers met in New York on December 7 to initiate plans for the June reunion and to review the suggestions which have been submitted. There is a strong urge to have this particular affair include the ladies, but with sufficient "Fourteen Only" events included. — H. B. RICHMOND, *Secretary*, General Radio Company, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York, N.Y.

1916

While in Boston recently, your Secretary had a pleasant chat with Sam Ellsworth. Sam, as you know, is one of our classmates who has stuck to the engineering profession. He is a professional and consulting engineer on sanitary engineering problems, maintaining a professional office in Boston. Sam is still the same boy we all knew at camp; still plays the violin and the piano well, and if properly influenced by sufficient internal stimulant, will demonstrate his good singing voice. Here's hoping we will have Sam with us at our next reunion.

The following is from a recent letter from Chuck Loomis at Memphis, Tenn.: "I had the good fortune to have lunch with Tom Little and Howard Claussen this fall; both of them as you know are in our Boston office, as is Dick Hunneman. I see John Phillips at our St. Louis office once in a blue moon. Rafael Alfaro, who was my roommate his last year at Tech

and from whom I had heard practically nothing for 20 years, turned up in this country a year ago. I had an exceedingly pleasant four or five days with him in Memphis. He seems to have engaged as a coffee planter and coffee processor in the mountains of Salvador, and he had just recently sold out his coffee interests and moved to San Francisco where his children were being educated. Unfortunately, I now understand that he has returned to Salvador. Apparently the severe decline in coffee values meant that some of the property he thought he had sold came back on his hands. I haven't heard anything directly from him since he left this country.

"I have one boy who will be ready for college next September and who may end up at Tech, although I have been getting him ready for Harvard. My other boy is two years behind him in school. They are both at Exeter this year. I took them over to Tech this fall and exposed them to one of Lobby's sales talks. He did a grand job. As a matter of fairness, I really should take the older boy out to Harvard and let them work on him too."

Here is a plug for Hen Shepard's bowling balls: "Our business has been running along fairly steadily and I have managed to take enough time off so that I can now boast that my golf average was just under 90 for the past season. My game was good enough to put me on the Summer Twilight Team for the Brae Burn Country Club. Our team won the season's championship by a small margin, and it was certainly a lot of fun. Since last spring I haven't been doing as much jumping around the country as usual, but did make a short trip to Chicago and took delivery of a new Packard in Detroit on the way back, which I drove home over the road. En route I had the pleasure of making a visit on Don Webster at Palmyra, N.Y. Don is now completely recovered from his last winter's sickness and is the picture of health. He is comptroller of the Garlock Packing Company. He boasts of three children with hopes of more."

It is with deepest sorrow that your Secretary announces the death of Louis W. Stevens, works manager of Veeder Root Company at Hartford, Conn., on October 26. — JAMES A. BURBANK, *Secretary*, The Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Coleman Brothers Corporation, 245 State Street, Boston, Mass.

1917

A midwest correspondent reports pre-Thanksgiving festivities of '17 interest in Chicago and environs. Present for serious business at the annual powwow of the land grant colleges were Art Miller and H. E. Lobdell, the former hailing from Wilson Dam as an "observer," while the latter combined his appearance with several other errands in the vicinity. Art looked hale and hearty; says the government plant down in Alabama is producing tons of inexpensive fertilizer and that any members of the Class who visit him there will be regally entertained.

1917 Continued

Since Dr. Compton made the principal address to the conglomeration of agriculturists, home economists, and engineering folk who compose the amalgamated Land Granters, the ten M.I.T. honorary secretaries in the Chicago zone seized the opportunity of tendering him a dinner to which Lobby was also invited. These ten, it will be remembered, are the lads who interview and sift out desirable candidates for the freshman class and otherwise represent Technology interests in Porkopolis.

Two of the ten are Penn Brooks and Skipper Works. Skip got himself marooned in Upper Michigan and missed the dinner, but he returned in time to attend a special aftermath meeting the next evening at the Brooks mansion in Hinsdale, Chicago's horsy social-registerite suburb. This meeting was honored by the presence of ex-President McGrady, way out West to further Kodapak interests, and R. Thompson Whitney, now resident in Chicago to build up the advertising lineage of *Red Book*, one of The Review's worthy contemporaries.

Our correspondent continues: "Yes, we mean our one and only Dick Whitney, graduate of Course XI, who in an elder day was sometimes known as Fat. From his mouth there still issues that effortless discourse — charming, suave, melodious, and felicitous as ever — which makes him our No. 1 choice as a transcontinental traveling companion. His discontinuance of Richard or Dick is understandable, and all of us are sympathetic, although the Thompson is rather strange. However, members of the Class calling at his office in the Palmolive Building will find that he responds to Fat, providing it is used, as we use it, in the sense of sleek." — RAYMOND STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass. PHILIP E. HULBURD, *Assistant Secretary*, Phillips Exeter Academy, Exeter, N.H.

1918

After a ten-year absence from these columns it is rather hard to get started again. I fear that I cannot keep up to the tone that Maggie has been using during the past decade, but I will do my best. I have let him carry on for the last two issues, the first issue because my election as secretary again came as such a surprise that I had not taken any notes on reunion and the second because I had been so rushed after the hurricane and tidal wave struck down here that I did not have the time even to think about class notes.

Speaking of hurricane and tidal wave, those of you who were at the reunion in June would never know the Weekapaug Inn now. In the archives of the Class, I am going to place a set of pictures that I took there a few weeks ago. The whole wing of the inn toward the main road is completely gone. The first thing you see is the fireplace, which, as you remember, was on the very inside end of the living room. As you go around to the front after practically swimming a deep cut about 35 feet wide and 12 to 15 feet deep that was torn out by the water between the ocean

and the pond in the rear, you find nothing but destruction. The pond was about 12 feet above regular level at the height of the storm. Garages, boathouse, sheds, and everything at the rear of the house are gone. Not a cottage is left standing from the inn as far up the beach as you can see. Mr. Buffum, the owner of the inn, saw the whole destruction from his cottage, which is on higher ground and back a bit from the water front. The inn will not be rebuilt on its present location but may be on higher ground at some time in the future. Perhaps our 30th reunion may be in the new Weekapaug!

I see by the New York *Times* that our Professor of Human Relations or Humanities or whatever Maggie wishes to call himself is going to give his course on marriage (this time it is to include home management and child training) at Simmons. His fame has reached the other side of the Charles. Wonder what luck he will have talking to a group of women? — Another thing that appeared in the New York *Times* is that our old friend L. Franklin vanZelm, our realtor from Larchmont, N.Y., has turned to illustrating children's books. He may not be the originator of Mickey Mouse but he has his own Monte and Molly in the book called "The Adventures of Molly and Monte" by Darwin James Adams. — Sam Chamberlain has deserted these shores again and is now sojourning with his family at his home in Paris. He must be up to some more pictures of France after the very nice ones that he has been doing in and around Marblehead during the last couple of years.

I would be glad to hear from any or all classmates at my old business address of The Thomas School, Rowayton, Conn., or at my new home address, 178 East Avenue, Norwalk, Conn. If any are passing through Norwalk and have a few minutes to spare, just give me a ring at the school during the day or at my home in the evening. I am not so near the heart of news as Maggie has been for the last ten years, so must depend upon each and every one of you to help me keep a column in The Review each issue. — GRETCHEN A. PALMER, *Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1920

I received definite proof that at least two members of the Class read the class notes because as a result of my appeal in the November issue I have gotten nice letters from Ed Bragg and Jeff Mead. Ed reports that he moved to California about a year ago and settled in Beverly Hills just in time to get hit by the California flood. He says: "After what has happened this year in some other parts of the United States, there may be a little less cynicism regarding California's unusual climate." Ed returned to New York last spring and is now located at No. 9 Rockefeller Plaza. He urges any friends and classmates to drop in and see him.

Jeff Mead says that he saw Art Radasch, Hank Caldwell, and McMullin at the meeting of the American Institute of Chemical Engineers in Philadelphia re-

cently. Radasch is now head of chemical engineering at Cooper Union, New York City. Hank Caldwell is still with the Swenson Evaporator Company, and McMullin is with the Mathieson Alkali Works. Jeff reports that Mrs. Jeff and his five fine children are all doing well. His address is 350 North Long Beach Road, Rockville Centre, N.Y.

Our distinguished classmate, Edwin Sharp Burdell, former Dean of Humanities at M.I.T., was inaugurated as director of Cooper Union on November 3, the date of the beginning of the 80th year of the Union. Through him I have more information about Art Radasch. For the past ten years Art was with the research and development division of the Barrett Company, supervising the construction and operation of new plants. Before that he was professor of chemistry in Alfred University. At Cooper Union, Professor Radasch will direct an enlarged program of instruction in chemical engineering, being in charge of new engineering laboratories covering an area of 2,500 square feet.

Charles E. Ruby is conducting courses in patent law and trade-mark and copyright law for the Massachusetts University Extension program. — George I. Brown has left Wisconsin and is now in Chicago where his address is the Plaza Hotel. — Buzz Burroughs is still with the Dexter Folder Company in New York City. — Don Ferris is no longer in Tarrytown, N.Y., and may now be reached at 700 Seward Avenue, Detroit. — Harold Hunter is with Tubize Chatillon Corporation, Rome, Ga. — Ned Murdough has gone back to Portland, Maine, and is with the Jenney Gasoline people there. His address is 358 Lincoln Street, South Portland. — Bob Tirrell is now in Tenafly, N.J., where his address is 61 Sussex Road. — HAROLD BUGBEE, *Secretary*, 7 Dartmouth Street, Winchester, Mass.

1921

At noon on Armistice Day, 1921 crashed the Transradio Press News broadcast over a coast-to-coast network of the Mutual Broadcasting System. Before your correspondent could whip out his ancient typewriter to record a verbatim account, the WOR announcer had raced through a statement that Munroe C. Hawes had been reelected as tax assessor of the town of Sea Girt, N.J., at the previous Tuesday's voting. The reason this item made news was that by the same ballot the good folk surrounding the Garden State's summer White House had also approved an ordinance abolishing the office of tax assessor.

We didn't believe the radio report quoting Munnies' words of despair, so we wrote to the ex-councilman and future governor of New Jersey for a confirmation of the facts. In reply, the Honorable Hawes says: "I did not hear the radio news but I've heard plenty about it! Most of the New York papers carried small articles in a humorous vein and I was invited to subscribe to a clipping agency with the inclosed story from the New York *Herald Tribune* as bait. So far I have

been greatly disappointed that MGM have not been around in person with their lion, as I thought that nothing less than a trip to Hollywood would be in order. The situation was peculiar but, instead of being the lone assessor, I will be chairman of the Assessment Board which was created as a result of the balloting."

Since receiving the foregoing, we have seen its author in person and can assure our readers that he has lost none of the weight and dignity which becomes a man who has successfully weathered a purge. Munnie is senior partner of the very successful real estate firm of Hawes and McAfee, Inc., of Manasquan, N.J.—two engineers who use slide rules principally for figuring salesmen's commissions! The Haweses have four fine youngsters, a boy and three girls, two of whom are in high school. When not developing new properties or finding swell shore places for vacationing Tech men, Munnie will be found Honorary Secretary among prospective Institute students or throwing one of the house or beach parties for which Alex and he are renowned.

No column of class notes can be complete without a welcome note from Professor Locke '96. This one tells of the latest travels of our world commuter, Hugh E. McKinstry, consulting geologist, who spent some time in the West last fall examining the Columbia, Eureka-Excelsior, and North Pole properties in the Cracker Creek mining district near Sumpter, Ore., and other properties in Grass Valley, Calif., for the Campbell Mining Company of New York. We have been trying to get Hugh to write a short account of his travels but he never visits his New York office at 120 Wall Street long enough to peruse our appeals.

To Howard F. MacMillin we extend the sincerest sympathy of the Class on the passing of his father in September. Howard has been elected to succeed his father as president of the Hydraulic Press Manufacturing Company of Mount Gilead, Ohio, and will also continue as general manager, a capacity in which he has served for the past two years. Mack has been associated with the organization since graduation from the Institute, serving successively as sales engineer, sales manager, director, vice-president, and general manager.

G. C. Dahl's new book, "Electric Circuits: Theory and Applications," Volume 2: "Power System Stability" has just been announced by McGraw-Hill. Volume 1, entitled "Short-circuit Calculations and Steady-state Theory," was published in 1928. Otto has resigned as professor of electrical engineering at Technology to join the staff of Jackson and Moreland in Boston.

Saint writes: "Roderick K. Eskew dropped in to see me in October, the first time that I had seen him since we left Technology. He is with the pulp division of the Brown Company, 420 Lexington Avenue, New York City, and lives in Ramsey, N.J. Rod has been with Brown for the past four years and spent about 10 months in Japan during 1936-1937 on rayon pulp applications. Prior to that he

was with Du Pont for nine years in the plastics division at Arlington, N.J., engaged in nitrocellulose research and applications. Right after graduation he was with Hercules Powder Company, Parlin, N.J., for three years. He is married and has one daughter."

Members of the Class seen at the fall smoker of the M.I.T. Club of Northern New Jersey included Max Burckett, George Chutter, Bill Emery, Munnie Hawes, Sumner Hayward, San Hill, Fred Kowarsky, Ed Lockwood, Lou Mandel, Ralph Wetsten, and Cac Clarke. Max Burckett has been elected treasurer of the Club, and your scribe is president. It was a very pleasant surprise to find Hill and Chutter in our midst. San dropped in on a trip from his home in Wilmington, Del., where he is with Du Pont. George is now living at 115 Central Avenue, Glen Rock, N.J. Both of these fellows promised to send us complete histories, and we hereby remind them of their obligations.

At the October meeting of the Alumni Council in Cambridge, it was announced that Warrie Norton has been elected Alumni Day chairman for 1939 in addition to his many other alumni duties. Everybody ought to start planning now to visit Cambridge next June for our "mid-term" meeting between the Fine Fifteenth and the coming Tremendous Twentieth!

The Register of Former Students reports that mail for Samuel Sharlach, X, has been returned from his last known address, 34 Franklin Avenue, White Plains, N.Y. Will anyone knowing his present address please send it direct to Cambridge? November brought the following changed addresses: Dana A. Barnes, XV, 98 North El Molino Avenue, Pasadena, Calif.; Harry Cole, I, U. S. Engineer Office, Memphis, Tenn.; Elmer W. Davis, II, 143 Allen Place, Hartford, Conn.; Glenn E. Fargo, IX-B, 3802 Beverly Drive, Toledo, Ohio; Ernest R. Gordon, XII, Amparo Mining Company, 2936 Serrano Road, San Bernardino, Calif.; Professor Dugald C. Jackson, VI-A, 5 Mercer Circle, Cambridge, Mass.; James Le Grand, I, 171 Washington Street, Hartford, Conn.; Captain Louis L. Lesser, I, 7th Field Artillery, Fort Ethan Allen, Vt.; Lieutenant Colonel Lewis A. Nickerson, II, Fort Sill, Okla.; Harry M. Ramsay, XV, 715 Dorian Road, Westfield, N.J.; Perry R. Taylor, XIII-A, 3910 Fifth Street North, Arlington, Va.

Other nomads have been recently reported at these new addresses: Dr. James V. W. Boyd, VII, 23 Federal Street, Springfield, Mass.; H. Seymour Colton, IX-B, Standard Building, Cleveland, Ohio; Arthur Esner, II, 1560 Drexel Avenue, Miami Beach, Fla.; Llewellyn B. Griffith, I, 1413 Fourth Street, Corpus Christi, Texas; Harold D. Griswold, XV, Slatersville, R.I.; Colonel Mark L. Ireland, Quartermaster Corps, United States Army, Headquarters, Philippine Department, Manila, P.I.; Francis B. Kittredge, I, Jones and Laughlin Steel Corporation, Room 901, 250 Stuart Street, Boston, Mass.; Charles L. Pool, XI, 40 Western Promenade, Edgewood, R.I.; Fred L.

Raymond, XV, Suburban Gas and Electric Company, 150 Beach Street, Revere, Mass.; Harold F. Stose, XIV, 3333 Kirkwall Road, Toledo, Ohio.

A happy trend is indicated by the small increase in the quantity of news received, but we need your aid to keep it that way. Won't you please write now?—RAYMOND A. ST. LAURENT, *Secretary*, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, 10 University Avenue, Chatham, N.J.

1923

A round couple of dozen turned out for the first of a series of evening parties of the Boston 1923 group, held at Walker, Monday, November 7. Those present included Archie Williams, Louis Greenblatt, Penn Howland, H. B. Golding, and the following with their respective wives: Howard Russell, Bernie Proctor, Frank Haven, Walt Marder, Herb Hayden, Ben Bullman, Ray Bond, Pete Pennypacker, George Johnson, and Ed Averell.

Arrangements for the party were made by Howard Russell. Archie Williams and Herb Hayden contributed to the evening's entertainment with reels of movies taken at the Saybrook reunion last summer. Archie's colored shots were particularly fine and will prove a valuable record of class activities to look at when later reunions roll around. The evening wound up with music and dancing. General agreement to meet again for a similar party before long resulted from the fine time all present enjoyed.

The Technology Men in Action page in the November Review reported the new post of Bobbie Burns, recently placed in charge of the laboratory of the Irrigation Department of Ceylon at Jawatte. Bob sent Pete Pennypacker some clippings announcing the opening of the laboratories, including pictures which gave some idea of the extent of the plant. One of Burns's problems, he writes, is the flooding, drainage, and irrigation of 25,000 acres of land at the south end of the island. Design of dams is another. Incidentally, Bob just passed the government examination in Singhalese, the local language.

A reunion is no place to work, a conclusion which your Secretary took literally to the extent of committing to formal notes very little of the information there available about the boys who were present. However, here are a few fragments of information not previously recorded, which are likely to be of interest: Bill Greenough, after three years in the Physics Department, was with the Texas Salt Company at Houston, Texas, for five years thereafter, finally in the position of general manager. In 1930 he was with W. H. Coburn and Company of Boston and in 1931 established the firm of Greenough and Gifford, in the investment business in Providence. He married Dorothy G. Rand in 1927 and they have three children, Ann Forbes, W. B. G., III, and Harriet Richards.

Tom Drew and Bob Hershey are both at the Du Pont Experimental Station at Wilmington, Del., and live in Kennett

1923 Continued

Square, Pa. Both were previously at the Institute, Tom leaving in 1934 and Bob in 1936. Tom says his work has been the design of heat exchangers, stills, and the like. Bob has been doing development work in the chemical division of the ammonia department. Both are married. Tom has two children, both girls. Bob reports one girl, aged nine, and a boy, five.

Jim Brackett is with the credit department of Sears, Roebuck and Company, Boston. — Art Belyea is with the Consolidated Edison Company of New York in New York City. — Ed Thimme is assistant to the division superintendent of the Public Service Electric and Gas Company at Paterson, N. J.

Al Redway says he's in the same business (Farrel-Birmingham Company, Ansonia, Conn., makers of heavy machinery), different job (in charge of manufacturing), has a new title: vice-president. — F. P. Squibb is western sales manager for the pigment color and chemical division of the Sherwin-Williams Company, with headquarters in Chicago. — Herb Hayden is plant engineer of the Du Pont plant at Leominster, Mass., has three children and a St. Bernard. (He showed us some swell movies of them all at the evening meeting mentioned in the opening paragraphs of these notes.)

Bill LaLonde is head of the department of civil engineering of the Newark Technical School (night junior college). — Alfred M. Perkins lives in Danvers, Mass., has been a fire insurance inspector for 13 years, and has three sons. He reports a raft of hobbies, including a leaning to Russians, — their language, food, and music; interior decorating, musical composition, and antique weapon collecting. — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree, Mass. JAMES A. PENNYPACKER, *Assistant Secretary*, 96 Monroe Road, Quincy, Mass.

1924

Back and forth across the Atlantic shuttled this information, finally to reach *The Review*. A New York correspondent wrote it for the *Yorkshire Post of Leeds*, England. That paper sent a copy to a New York clipping bureau, from which we have it. Arthur Kallet is the subject. He is now managing director of the Consumers' Union, whose announced purpose is to protect consumers from goods which are overpriced, misrepresented, fraudulent, or injurious. Says the *Post*: "In 1930 Kallet joined Consumers' Research and became a director. A dispute resulted in Kallet setting out to form Consumers' Union. Today Consumers' Union is outstripping Consumers' Research."

For versatility, we bow to Chick Kane. In addition to a busy job with the Boston Edison Company, Chick has recently authored a book entitled, "The Alphabet of Birds, Bugs and Beasts," described in favorable newspaper reviews as designed to stimulate interest in nature study. Chick also talked at the nationally famous Book Fair of the Boston *Herald*, and at the same time won recognition for

an exhibit of 81 nature prints at the American Museum of Natural History in New York.

Ted Kenyon, known to the aviation industry as a leading inventor and designer of airplane instruments, as well as for his exploits and those of his wife in the air, is an important part of the Sperry organization in New York.

The hurricane blew a letter out of Bump Brown, who wrote to ask the Secretary for a copy of a booklet which the New England Telephone and Telegraph Company published to describe storm damage. Bump is assistant manager of the Connecticut Valley Power Exchange in Hartford, specializing in the transfer of both hydro and steam power, has a daughter 11 years old, and lives in Wethersfield. He is studying celestial navigation as a hobby and regrets, apparently for the first time, the fact that he slept through so many astronomy lectures.

Letters are beginning to come in about next June's 15th reunion. While the committee is still in process of formation, many more letters would be welcome on the subject of where the party should be held, what kind it should be, and so on. — FRANCIS A. BARRETT, *General Secretary*, 50 Oliver Street, Boston, Mass.

1926

The Secretary has just received an interesting letter from Dave Shepard, our London representative, written on board ship en route to Bergen. He was starting a business trip which would take him to Oslo, Stockholm, Helsingfors, Copenhagen, and Hamburg. Dave gave a graphic description of the conditions in London during the last war scare: "The miles of shelter trenches which suddenly appeared in London's parks, the hundreds of trucks (lorries to me!) full of sand which passed our house on their way into London, the sudden departures of friends and associates who were in the Naval Reserve or the Territorials (militia to you!) . . . made it a very tense time."

The Secretary recently had welcomed notes from Elmer C. Warren, who is registrar of Colby College, and from C. A. Harrison, who is vice-president of Fairchild Aviation, Inc. Harrison, whom we know as Dave, is active in furthering the small airplane for general lay use. He is a member of the board of directors of the Taylor-Young Airplane Company and has been associated with Fairchild since 1928, when he was appointed advertising manager. In October, 1929, he became sales manager of the Fairchild Aerial Camera Corporation.

Our agents report that Allen Orth was much in evidence at the General Motors exhibits at the automobile shows. He is manager of publicity for the General Motors Research Laboratory and he was involved in the preparations for their famous Parade of Progress which toured the country. — H. Garcia Capurro, who is an engineer with the Compañia Sud-americana de Construcciones in Montevideo, visited the Institute recently with his wife, this being her first trip to the States. It was a pleasure to see them both.

— Frank D. McKeon is secretary of the M.I.T. Club of Central New York, headquarters in Syracuse, and is therefore a contributor to this eminent journal. — J. RHYNE KILLIAN, JR., *General Secretary*, Room 3-208, M.I.T., Cambridge, Mass.

1927

A short time ago, we wrote in these columns about the advancement of Jack Herlihy to the position of operating superintendent for United Air Lines. Consistent with the profession, Jack has again taken off and risen, this time to the position of vice-president in charge of operations for United. Among other duties he has recently been technical contact executive for United in the development and construction of the four-engined Douglas DC-4.

The approaching marriage of Miss Louise Lenore Ruffner of Highland Park, Ill., and Alfred Leach has been announced. Leach is living in Schenectady. — Quoting the September 26 issue of *Life*: "Edward D. Stone of New York City, whom LIFE commissioned to design a 'modern' house for the Ramseys. . . is the leader of the younger school of American architects, reputed the 'brightest young man' in the profession. At 36 he has probably created more modern houses than any other Eastern architect. He helped design New York Hospital, Waldorf-Astoria Hotel, Rockefeller Center, Museum of Modern Art."

A report from a meeting of the Engineering Association of Hawaii in Honolulu on September 30 tells of an expertly managed show staged by Ralph Johnson, one attraction being "the display of feminine pulchritude." Still a maestro!

Your Secretary is able to report an interesting and bewildering third quarter of 1938, which may be partly responsible for the scarcity of 1927 notes in the current volume of *The Review*. Early August brought me a rather sudden transfer from the Waukegan, Ill., plant of Johns-Manville to their headquarters in New York. Except for a few days in the East, the move was delayed pending the arrival of Miss Susan Hibbert on September 9 in Waukegan. This being a new experience, your Secretary was truly bewildered but managed to pull through very nicely, along with the rest of the family. We are nearly settled now (Thanksgiving) in our apartment, Colchester Hall, Garth Road, Scarsdale, N.Y. Being now a regular patron of the Grand Central Station, your Secretary accidentally met Bruce Sherrill just two days before his recent marriage. Newspaper clippings will bring further information about the young lady, but at least at long last we have been able to give you this word about Bruce. — Another chance meeting, this time with Alan Beattie, was necessarily quite brief. However, we did learn that Al is still with the Atlantic and Pacific, has offices in the Graybar Building, and is living on a Connecticut farm about eight miles from White Plains, N.Y. — Warren Smith recently changed jobs, going with the Carnegie-Illinois Steel Corporation as a methods engineer with

1927 Continued

particular interest in the adaptation of tabulating machine equipment to the company's accounting system. Smithy will remain in Pittsburgh, where he has lived for several years in his previous connection with the Koppers Company.

Your Secretary will find it a great pleasure if 1939 enables him to report the continued advancement of 1927 men, one by one. May our columns be crowded with such announcements. A Happy New Year, gentlemen. — **RAYMOND F. HIBBERT**, *General Secretary*, Care of Johns-Manville Corporation, 22 East 40th Street, New York, N.Y. **DWIGHT C. ARNOLD**, *Assistant Secretary*, Arnold-Copeland Company, Inc., 222 Summer Street, Boston, Mass.

1928

Ben Kelsey, II, stationed at Wright Field in Dayton, Ohio, last October, once more broke into the headlines of the national press by flying a new army pursuit plane from Dayton to Buffalo at an average speed of 350 miles an hour. Although setting a record for an American military plane with full military dress, Ben modestly told the Buffalo airport officials upon arrival that the only purpose of his flight was to confer with officials at an aircraft factory in Buffalo on a still newer army pursuit plane. Officials at the Buffalo factory where the plane was made said Ben's speed was approximately two miles an hour slower than that of Howard Hughes in a recent transcontinental flight in a special racing plane.

From a San Francisco newspaper paying high tribute to the steady and rapid expansion of the Lockheed Aircraft Company, a tribute to another classmate, Hall Hibbard, is garnered. We quote the following about Hall, as it tells briefly of his experience during the past ten years: "Hall L. Hibbard, vice president and chief engineer of Lockheed, is responsible for the development of new designs to meet future requirements of aircraft operators. Shortly after graduating from Massachusetts Institute of Technology in 1928, Mr. Hibbard joined Stearman Aircraft. In 1931, he was made chief engineer of Stearman-Varney Company at Alameda, California, and in the following year went with Lockheed."

Jack Barnes, VI, is now teaching mathematics at Tufts College. During the past summer Jack and his wife took a trailer trip across the country and when in Alameda, Calif., looked up Bill Beard, XI. Bill is teaching at California Tech and of late has become an amateur aviation enthusiast, now owning his own plane.

My next morsel of news is most unpleasant. On November 8 Walter Hoppe, VI, died of leukemia, a form of anemia in which the red corpuscles turn to white. Walter had his first attack about a year ago and was sent to the hospital for blood transfusions. This seemed to revive him for a short time, but the trouble continued to recur. During the latter part of August, Walter left his work at the General Railway Signal Company of Rochester, N.Y., in a vain effort to regain

his health. His condition steadily became worse, resulting in death. Walter is survived by a wife and young daughter. To both we extend deep sympathy.

Course I men will be happy to read the following, excerpted from a letter to Ralph Jope from Pete Moyano, telling of Pete's experiences since leaving the Institute: "Of all the people the one I thought I'd never hear from was you, and nevertheless you were the one I first heard from ever since I have been around this part of the country. I used to hear from George Mangurian, who was at the time connected with some airplane manufacturing concern, but that was way back in 1929. I also heard from Morrill, you remember — the fellow who came to us from West Point — but that was long ago, too. . . ."

"We were graduated on June 5, and after staying a few days at home I reported for work with the Southern Pacific Railroad of Mexico at San Blas, Sinaloa, as assistant to the resident engineer on the first of July, 1928. They were putting up a steel bridge with different span lengths and different types of bridge structure for those unequal spans; we have two 300-foot Pratt trusses, three 70-foot half-through trusses, and six 100-foot open-deck girders. All of these details may vary somewhat, as all I'm telling you now happened in 1928. It was very interesting work, what with giving transit points for the launching of the forms for the piers and running levels for same and, on the side, watching the driving of wooden piles for the spur used meantime for the trains to go through, and inspecting some other small works for the railroad, like the replacement of stringers in wooden trestles, and so forth. The work of building up the piers was a compressed-air job and very interesting, too, so much though that I got an eardrum busted. When this happened, I almost went to New York to have it fixed, but unfortunately one of the railroad doctors thought that he could fix me up, and he tried it. He did not fix me up properly, but he sure spoiled my trip to New York and with all expenses paid, too. This contract work was done by the Missouri Valley Bridge and Iron Company, of Leavenworth, Kansas, I think. When they were putting up the two 300-foot trusses, I also had to inspect the riveting and, believe me, one sure has to learn to go up in those steel girders. Anyway, the bridge was finished around March of 1929, and I moved somewhere else, still with the railroad." (To be continued.)

May we hear about your doings? — **GEORGE I. CHATFIELD**, *General Secretary*, 6 Alben Street, Winchester, Mass.

1929

Once again a reminder that in a few more months we will gather at an appointed spot in the East to celebrate our 10th anniversary as Alumni. Yes, sir, our 10th reunion is rapidly approaching. Brig Allen, XV, has been organizing the preliminaries, and his last letter indicates that Fish Hills, XV, will probably head the committees that will handle the pro-

gram, and so forth. If reports of our predecessors can be relied upon, there is a grand time for all at one's 10th reunion. Get back and frolic with the gang that went out into the cold world to live down the alleged ambition to "marry the boss's daughter" that Tubby Rogers pinned on us and of which we were so often reminded that first year or two. You can rest assured that your committee will arrange the reunion to everyone's satisfaction. They have all the experience of the 10th reunion committees of the Classes of 1927 and 1928 to draw upon, which, combined with their own ideas, should assure us of a fine get-together. Look for early announcements and start making your plans now.

We trust that Santa visited all your firesides during the holidays just past and that your Christmas was most merry. We hope, too, that you all will enjoy a happy, prosperous, and healthy New Year. At the time of this writing (late November), your Secretary is making plans to travel East for Christmas, which will be the first such Christmas trip for us as a family of three. Alice Judith is now nine months old and getting along famously. Another month's development should help in fitting her for the long train ride, but this year Christmas will have very little meaning for her. However, our families have not seen her since last summer when we were East, and her visit should help their Christmas.

Early in October the Boston papers carried the announcement of the marriage of Miss Phyllis Scott to T. B. Curran, X, in Bridgeport, Conn. The Currans will reside in Bridgeport, where T. B. is now affiliated with the Remington du Pont Company as a research chemist. This is our only wedding announcement and there are no engagements this month, which is quite a drop from the record of last month. Hence to Tom and his bride, we extend our exclusive best wishes for a long and happy life together.

From Charlie Locke's ('96) office we have the announcement that Donald L. Hibbard, IX-C, who received his doctor's degree in 1933, was invited to be president of Parsons College, Fairfield, Iowa, and assumed that office on July 15. He joined us in our junior year after preparing at the College of Emporia and majored in mathematics. According to the last Register of Former Students, Hibbard was connected with Aetna Life Insurance Company of Hartford, Conn. As far as your Secretary knows this is our first college president, and to Hibbard, we send our collective congratulations on his attainment of this honor.

Now from the sublime to the reunion. Look for early announcements and plan accordingly. Most of all, plan now to be there. The committee will take care of the details. Happy New Year. — **EARL W. GLEN**, *General Secretary*, Box 178, Fairlawn, Ohio.

1930

Jack Bennett, II, joins me in extending to all members of the Class our greetings and good wishes for the New Year. In

1930 Continued

a recent letter from Australia, Jack writes: "... If any of the boys want to know about life in Australia, you can tell them for us that it is most enjoyable. The country is carrying along on a relatively high level of business prosperity. Probably we will see something of the recession here before the end of the year (1938), but with a balanced federal budget and a settled labor market, the country would seem to be in a relatively fortunate position as compared with the United States at the present time. Actually, this country does not seem like a foreign land in any sense of the word, and from the day we arrived we felt very much at home, which feeling increases as time goes on. The people here emphasize out-of-door activities more than night clubs and the gay social life, which I think makes for a much saner way of living. The pace of existence is definitely slower here, and the people are willing to take the time required to enjoy the smaller and more real pleasures in life. . . . I hope that all goes well with you and please give my regards to any of the Boston crowd that you run into. . . ."

In reply to your Secretary's earnest plea for copy, Bill Thomas, XVII, rallies to the standard with the news that he is still a bachelor, lives in Newburyport, Mass., and works as senior draftsman in conjunction with a municipal survey of streets and highways. Bill is anxious to learn what the other Course XVII boys are doing, particularly since he read about Reg Bisson in the November issue.

Al Bird, XIII, is the third member of our Contributor's Club this month, sending a chronology of his eight years since graduation. The first of these was spent in Florida designing power yachts and learning how to sail (more about this later). But people stopped buying yachts, so Al returned to the Institute for graduate work in engineering administration. A short period of selling was followed by several years of advertising research. After that a year of executive training in a factory in Nashua, N.H., found Al trying to decide whether or not to accept an appointment in the Navy's Bureau of Engineering in Washington. Well, he's been in Washington for three years now, likes the work, and his interest in sailing has led him to invest in a fast sonder boat. In 1937 he won the President's Cup in the Washington Regatta and he says the cup is real silver! During this past summer he raced considerably and, after winning a number of fine trophies, concluded the season's racing by marrying the young lady who sailed with him as crew. She is as much interested in yachts and in sailing as is her husband, for whom the Class wishes every happiness.

Bob Crowell, XV, proudly reports the birth of his first child, Joan Mary, on May 25. As we go to press Joan weighs something in excess of 16 pounds, and her dad uses only superlatives in describing her. Members of the Class may write to 21 Kemper Street, Wollaston, Mass., for their cigars. — PARKER H. STARRATT, *General Secretary*, 75 Fenno Street, Wollaston, Mass.

1933

As that eight changes to a nine, we now have 1939, and it is getting around to six years since most of us left Boston. Much has happened during that time. The gang is pretty well distributed geographically, as well as in a wide variety of industries.

From the society columns we again have a few announcements of engagements. That of Robert A. A. Hentschell to Miss Jean Elizabeth Hogenauer was announced on October 9. Bob is in the research laboratory of the Remington Arms Company. The engagement of Horace S. Beattie to Miss Doris Alliaume was announced on October 16. Edward L. Dame and Miss Burnley Welsh were married on October 1 and are making their home at Wallingford, Pa. Lawrence C. Kingsland, Jr., who married Miss Margaret Fitz on October 8, is a member of the class of 1940 at the Harvard Medical School.

A short while ago I had a letter from Bill Pleasants, who is now living in Atlanta, Ga. He is a service engineer in that territory for the Raymond pulverizer division of the Combustion Engineering Company. Bill says his wife and he are enjoying their home in Atlanta, in contrast to traveling through some 36 states in the two and a half years they have been married.

I also had a couple of letters from Beau Whitton, one during the summer, at which time he had a little job in Charleston, S.C., to supervise some construction work down there. He has since gone back to Charlotte, N.C. As you know, Beau is associated with his brothers and his father in the Southeastern Construction Company, and he sure sounds like a plutocrat the way he talks of the millions involved in the government projects they bid on. — That's all for now, and we hope there will be some more next month. — GEORGE HENNING, JR., *General Secretary*, Belmont Smelting and Refining Works, Inc., 330 Belmont Avenue, Brooklyn, N. Y. ROBERT M. KIMBALL, *Assistant Secretary*, Room 3-102, M.I.T., Cambridge, Mass.

1935

How do you like the news column this month? Looks as if you had better write a letter to Dick or myself, and I *do* mean you. — ROBERT J. GRANBERG, *General Secretary*, Central Y.M.C.A., 100 Gibbs Street, Rochester, N. Y. RICHARD LAWRENCE, *Assistant Secretary*, 111 Waban Hill Road, North, Chestnut Hill, Mass.

1936

An old cliché says: "No news is good news." This month we have practically no news but what there is of it appears to be good. Perhaps the best news we have — I never did believe in saving the best things for last — is that two more members of our Class are now happy fathers. On August 27 a daughter was born to Mr. and Mrs. John R. Graham in Albuquerque, N. M. The young lady's name is Carolyn Clark Graham. Dick Robinson of Niagara Falls is the other proud papa:

Junior — he was named Richard Sewall after his father — was born on October 5.

Another bit of especially good news came to me from Elliott Robinson. He says that Ken Cook, VIII, is back at school finishing work for his bachelor's degree. Ken's friends will be glad to hear that he has recuperated from the illness which kept him from spending his senior year with us. Ken reported that Wayne Hazen has finished all the work except the thesis for his doctor's degree in California and spent last summer in Europe on a tandem with his sister, who was graduated from Wellesley last June. Other news coming via Elliott Robinson is that Aaron Loomis was married at last, but I don't know the exact date. The bride, formerly Miss Natalie High of Brookline, was graduated last June from Smith College. Elliott recently had a Walker supper with Ed Stritter, X, of the Boston Woven Hose and Rubber Company. Both are taking evening courses at M.I.T. so that explains the meeting in Walker. Ed likes his work and commutes every day from Nahant. Finally, Elliott reports that Ed Halfmann was recently in Boston with news from Philadelphia. The Tech gang in Philadelphia gathered not so long ago at Bill and Marian Saylor's apartment for a reunion and chat. All seems to be well there. Elliott, by the way, is assisting Robert Vose '31 in his testing materials course at Harvard University and working for a master's degree there.

The only wedding to come to our attention through the newspaper columns this month is that of Francis Bonzagni to the former Doris Louise Smith. The couple are living at 34 Willow Street, Winthrop, Mass., and the groom is employed as assistant chemist in research for the Merrimac Chemical Company.

Course XIII. At least we have one faithful group. We always have some news from the fellows in XIII and XIII-C. Art Wells is on a trip around the world, so his place is being taken this month by Russ Miller, who writes: "At this moment (November 14), I should judge that Art was somewhere out of Mombasa on board the S.S. *Robin Adair* bound for India, after having had a fine time delving into the mysteries of Africa. There is one thing about Course XIII or at least XIII-C — the boys do like to travel around. Harrison Woodman was to pass the news on for The Review, but he informs me of his plan to sail on November 16 for a short vacation in Europe returning just before Christmas. Woody has completed a fine piece of work with the organization which has been winding up the affairs of what used to be the Munson Line. Our illustrious entrepreneurs up in Boston, President Stapler and Vice-President Anderson of the Seaboard Navigation Company, seem to be getting along right well as far as we can determine. Some one of these days we'll just have to call on them and have a good old chat and hear something about real ship operation. I have heard a rumor to the effect that they have rounded out their

1936 Continued

service between Boston and Maine ports with an additional vessel. If I am correct, she is the *Breeze*, to be named the *Kennebec*, and will run in direct service between Bangor and Boston. The old potatoes must be moving out of Maine, indeed." Russ is correct. The present *Penobscot* will ply between Maine ports and Philadelphia, Norfolk, and Baltimore. Russ, himself, is kept busy with marine insurance at the office of the Atlantic Mutual Insurance Company, 49 Wall Street, New York City.

In conclusion, I wish to the members of our Class and their families a happy holiday season. And here's hoping a letter to your Class Secretary is one of those New Year's resolutions that you keep. — ANTON E. HITTL, *General Secretary*, 491 Ashland Avenue, Buffalo, N.Y. ALLEN W. HORTON, JR., *Assistant Secretary*, Room 3-208, M.I.T., Cambridge, Mass.

1938

Here's the second batch of class notes which your laboring Secretaries and ghost writer (R. L. Johnson) have turned out for, we hope, your enjoyment and edification. However, we have, as yet, only a handful of Course Secretaries, and until we have our full quota of news gatherers, these notes will suffer accordingly. Any of you who have the inclination to keep in touch with your fellows and who would be willing to drop us a line now and again are asked to inform us in order that we may get your names and addresses in the class notes.

At this time, however, we are proud to present the following Secretaries: *Course I*, Tom Evans, who can always be found at the Y.M.C.A. in Coraopolis, Pa., when not designing and building bridges and dams for Dravo. Tom is already in touch with most of his classmates and has (by authority of Al Bates) a regular news-gathering system all worked out. *Course II*, Ken Gunkel, 2511 East Avenue, Akron, Ohio, whose adventures graced the pages of the last issue. *Course X*, Fred Kolb, our "unofficial" correspondent for this Course (the official job is not yet taken), who is so very efficient that we will list his present address, The Graduate House at M.I.T. We know that he would be glad to hear from any and all. *Course XIII*, Al Bates, who also sleeps at the Y.M.C.A. in Coraopolis, Pa., when he is not designing barges and canal boats for Dravo.

Now to get back to the serious business of reporting news: We know that our beloved President, Jack Wallace, was heard from in the last issue, but this time he has included some real news flashes along with a request "to keep our little scandal out." (Out of what, and what

scandal? — *Secretary*.) Jack writes: "Fred Dubois, XV, is now doing a stretch with the United States Rubber Company in Passaic, N.J. — L. W. Hull of cannonball fame and B. W. Mehren of general fame are in Philadelphia, rooming together, working apart. Mehren works for Crown Can Company, makers of that handy little article, the beer can, and tests the effects of canning. Hull works for F. J. Stokes Machine Company, makers of chemical machinery and, among other things, aspirin tablet machines. — Down on Long Island, N.Y., Henry Sieradzki, XVI, slips between pickets, spies, and other un-American phenomena to work for the Brewster Aeronautical Corporation." — In Dundalk, Md., R. M. Robbins, J. J. Ford, L. H. Allen, and our informer are working for Pan American Airways and doing their own cooking. Says Jack: "We have dishpan hands and can't do a thing about it, but we like our work and think aviation is just peachy." Incidentally, this gang's address is 7002 Mornington Road, Apartment C, Dundalk, Md., in case anyone requires further details.

From reports of our scouts we gather that about everyone in Course X-B is in some practice school or other and either working very hard or having a fine time. For instance, we have received the information that one group, including Bert Grosselfinger and our Secretary (this is the first we have heard of the latter in some time!) found a way to get beer direct from the brewery while the boys were in New Jersey, and proceeded to empty 700 bottles in six weeks! In all justice it should be added that there were eight consumers concerned.

Frank Gardner and Fred Reuter are reported to be back at Tech doing graduate work. Both of them spent the summer in Germany working for an affiliate of General Electric, and since they were in Berlin they should be able to give us some firsthand information on affairs there. — Eben O'Brien, X, is also doing graduate work at the Institute, and Dave Acker is working for Professor Hottel '24, doing some high-powered research in chemical engineering. — Frank Atwater, XV, has his name on a door in Building I, and we understand that he coached the sophomore crew for the Field Day race. (They lost!) — Howie Banzett and Gifford Griffin are also back at School, doing some work in II-A. — Traveler Ira Lohman has just settled down in Boston with Jackson and Moreland and describes himself as a stooge in a consulting engineering firm, and says he likes it first rate. Also with Jackson and Moreland is Tommy Oakes, XVII. — The government has claimed some of us, namely, Johnny Glacken, who is working for the

THE TECHNOLOGY REVIEW

Corps of Engineers, United States Army, and Jim Thomson, who has gone down to Pensacola, Fla., to try his hand at flying for the Navy.

Dick Young, formerly of Course II and other places, and now one of New Bedford's leading industrialists, bobbed up after the hurricane and reported some tall tales of the breeze. His car was inundated, but he now has a brand-new one and has a much firmer belief in flood insurance than he had. — Bill Camp, XV, is in Manchester, N.H., doing motion- and time-study work for the International Shoe Company. He reports that he likes it a lot.

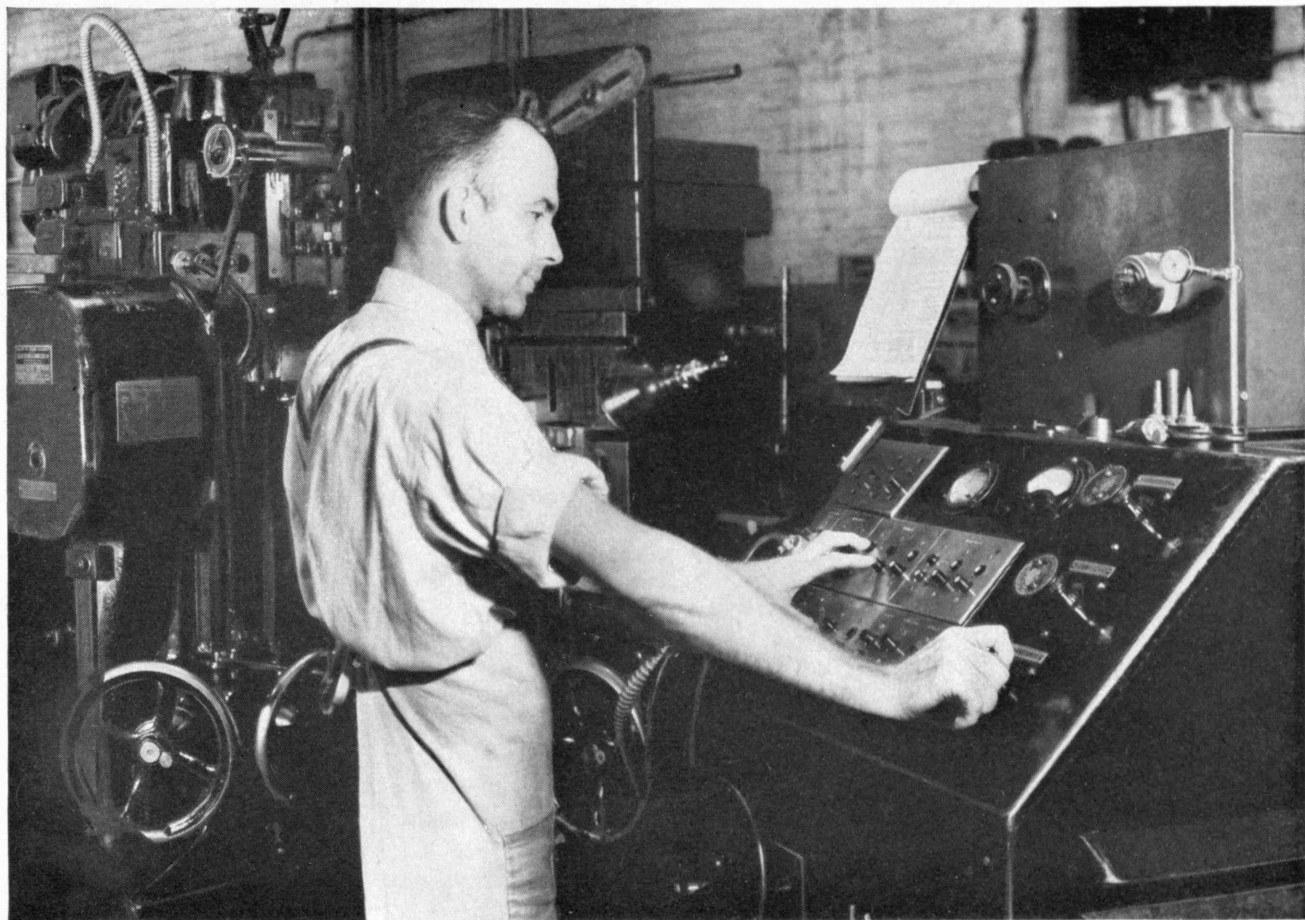
In a recent letter Al Bates has described a most interesting interlude which he and Bill Gibson (also Course XIII) enjoyed while with Dravo. Al writes: "It seems that among other things Dravo owns the Union Barge Line, running from Pittsburgh to Memphis, New Orleans, and Texas. They figured we ought to see something of the business, so Brother Gibson and yours truly spent three weeks on the Ohio and Mississippi between here and Memphis. We were only in Memphis one night and one day, but we stayed at the best hotel in town at the company's expense and had *filet mignon* on the roof with the manager of the line's Memphis terminal. We were on two boats during the trip, one a stern-wheel steamer built in '29 and the other a Diesel screw boat built in '36. As we were given guest quarters and had nothing to do, it was essentially a vacation with pay. The food on these boats, incidentally, is excellent. Bill got ambitious and passed coal, fired boilers, and so on, and when one of the coal-passer deck hands sprained his ankle this side of Cincinnati coming north, Bill got the mate to hire him as a deck hand for the rest of the trip." Al has a lot more to say about the technical details of locking up and down the river, and his description of the country makes us think that he should have been a geographer.

Our social notes are only rumors, but we will include them, hoping that they will be either confirmed or denied. Engaged is Abbott Byfield, who is planning to be married right after he gets his master's degree this coming June. Waddy Hinds was married in the early part of the summer, with Carle McEvoy and Lewis Hull acting as ushers. Phil Briggs, XIII-C, was also married some time last summer.

Please don't be afraid to drop us a line, since all the class news has to come from you fellows, and we cannot hope to divine what each of you is doing. — DALE F. MORGAN, *General Secretary*, The Graduate House, M.I.T., Cambridge, Mass. LLOYD BERGESON, *Assistant Secretary*, 885 Beacon Street, Newton Centre, Mass.

Do You Bind Your Review?

THE REVIEW has available a few leather bound volumes, each containing nine issues. If you desire bound volumes, these may be purchased at low prices. Address the Business Manager, Room 3-219, M.I.T., Cambridge, Mass.



A MAESTRO OF POWER

SWIFT and responsive as the strings and brasses of a great orchestra, power moves beneath this man's finger tips. Electric power, varied at his will from the crashing force of ten thousand sledges to the delicate pianissimo that pares a hairbreadth from a piece of steel. And so, from the machine that obeys this man's bidding rolls forth the symphony of American industry—*more goods for more people at less cost.*

This man is typical of the millions of American workmen who, with the machines they direct, set the tempo of American industry. Today the mechanical power in the hands of each factory

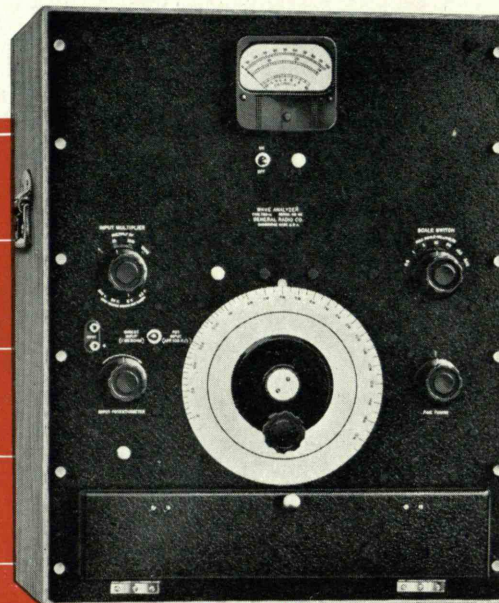
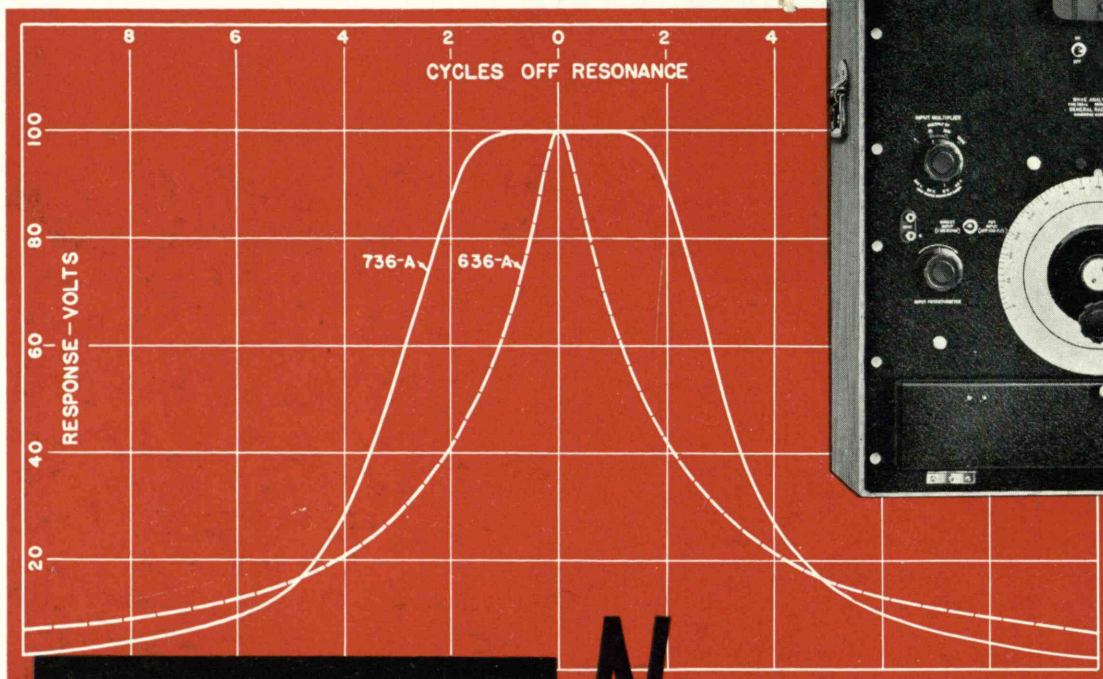
worker is four times what it was 50 years ago. As a result, the amount that each worker can produce has more than doubled. And because he produces more, he has more.

That is why five out of six American families own radios, why four out of five have automobiles, why one out of three owns an electric refrigerator. That is why America has today the highest standard of living the world has ever known. And General Electric scientists, engineers, and workmen, by applying electric power to the machines of industry, have done much to make this progress possible. Their efforts today are directed to the task of bringing about still higher living standards.

G-E research and engineering have saved the public from ten to one hundred dollars for every dollar they have earned for General Electric

GENERAL  ELECTRIC

90-107DH



New Wave Analyzer

THE NEW Type 736-A Wave Analyzer provides the simplest and most accurate method for making analyses of all types of complex waveforms. This instrument, a heterodyne-type of vacuum-tube voltmeter responding to an extremely narrow band of frequencies, is a development of the popular Type 636-A Wave Analyzer introduced by General Radio several years ago.

The new analyzer has the following mechanical and electrical improvements which contribute to its increased sensitivity, improved stability and more convenient operation:

- **CRITICAL TUNING UNNECESSARY:** flat-top tuning characteristic 4 cycles wide (see curve)
- **EXTENDED VOLTAGE RANGE:** 300 microvolts to 300 volts, full scale, with 1 megohm input impedance
- **IMPROVED SELECTIVITY:** new 3-crystal filter increases discrimination against unwanted voltage. Attenuation at 60 cycles from resonance is 75 db (0.02%)
- **INCREASED STABILITY:** all components protected from effects of humidity. Oscillator and amplifier stability improved greatly
- **EASIER OPERATION:** improved calibration circuit makes precise balancing unnecessary and speeds up measurements
- **A-C OPERATION:** with hum voltage less than 50 microvolts
- **NO EXTERNAL MAGNETIC PICK-UP:** balanced modulator is fed by a phase-inverter tube instead of a transformer

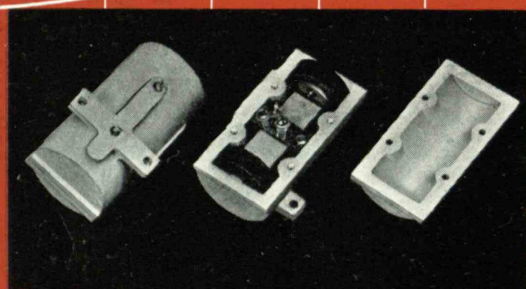
TYPE 736-A WAVE ANALYZER.....\$640.00

Write for Bulletin 349 for Complete Data

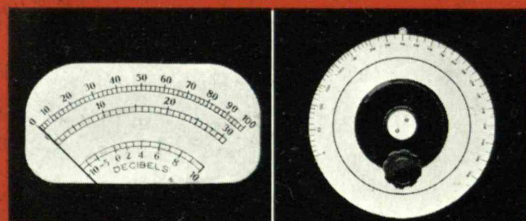
GENERAL RADIO COMPANY

Cambridge, Massachusetts

BRANCHES: New York and Los Angeles



Hermetically sealed, 3-electrode quartz crystal in rubber cushioned, cast mounting frame



Illuminated linear meter with auxiliary db scale

Direct reading from zero to 16,000 cycles



Low-impedance, stable, aperiodic amplifier of moisture-proof construction

PRECISION ELECTRICAL LABORATORY APPARATUS

